

EPSON[®]
EQUITY[®] 386/33 PLUS

User's Guide

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Important Safety Instructions

1. Read all of these instructions and save them for later reference.
2. Follow all warnings and instructions marked on the product.
3. Unplug this product from the wall outlet before cleaning. Use a damp cloth for cleaning, not liquid cleaners or aerosol cleaners.
4. Do not use this product near water.
5. Do not place this product on an unstable cart, stand, or table.
6. Slots and openings in the cabinet and the back or bottom are provided for ventilation; these openings must not be blocked or covered. This product should never be placed near or over a radiator or heat register.
7. This product should be operated from the type of power source indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.
8. Connect all equipment to properly grounded (earthed) power outlets. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Avoid using outlets on the same circuit as photocopiers or air control systems that regularly switch on and off.
9. Do not locate this product where the cord will be walked on.
10. If an extension cord is used with this product, make sure that the total of the ampere ratings on the products plugged into the extension cord do not exceed the extension cord ampere rating. Also, make sure that the total of all products plugged into the wall outlet does not exceed 15 amperes.
11. Never push objects of any kind into this product through the cabinet slots. Never spill liquid of any kind on the product.

12. Except as specifically explained in the User's Guide, do not attempt to service this product yourself. Refer all servicing to qualified service personnel.
13. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
 - A. When the power cord or plug is damaged.
 - B. If liquid has entered the product.
 - C. If the product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions, since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.
 - D. If the product has been dropped or the cabinet has been damaged.
 - E. If the product exhibits a distinct change in performance.

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Introduction

This *Equity® 386/33 PLUS User's Guide* contains the information you need to get the best results from your computer. You'll find instructions for adding options to your system such as disk drives, option cards, or a math coprocessor, as well as general reference information such as how to use diskettes, test your system, and troubleshoot minor problems.

Note

For instructions on setting up your system or changing the SETUP configuration, see the Setup Guide.

You don't have to read everything in this book. Its contents are summarized below:

Chapter 1 covers general operating procedures, such as using and caring for disks and disk drives.

Chapter 2 describes special features you can use to enhance your system's performance.

Chapter 3 tells how to remove and replace the computer's cover and subassembly to reach internal components.

Chapter 4 describes some of the options you can use in your computer and instructions for setting jumpers, replacing the battery, and installing options.

Chapter 5 explains how to install and remove disk drives.

Appendix A lists the specifications of your computer, Appendix B covers the system diagnostic tests you can run, and Appendix C contains troubleshooting tips.

At the end of this manual you'll find a glossary and an index.

Where to Get Help

If you purchased your computer in the United States, Epson America provides local customer support and service through a nationwide network of authorized Epson dealers and Service Centers.

Epson also provides the following support services through the Epson Customer Resource Center at (800) 922-8911:

- Technical assistance with the installation, configuration, and operation of Epson products
- Assistance in locating your nearest Authorized Epson Reseller or Service Center
- Sales of ribbons, supplies, parts, documentation, and accessories for your Epson product
- Customer Relations
- Epson technical information library fax service
- Product literature with technical specifications on our current and new products.

If you purchased your computer outside of the United States, please contact your dealer or the marketing location nearest you for customer support and service. International marketing locations are listed on the inside back cover.

Chapter 1

Using Your Computer

This chapter briefly describes the following procedures for using your computer:

- ❑ Copying the Reference and Utility diskette files
- ❑ Using special keys on the keyboard
- ❑ Stopping a command or program
- ❑ Resetting the computer
- ❑ Using a password
- ❑ Using disks and disk drives
- ❑ Preparing a hard disk for moving.

These instructions assume you have already installed the operating system on your computer according to the instructions in your operating system manuals.

Copying the Reference and Utility Files

If you have a hard disk, you'll probably want to copy some of the files on your Reference and Utility diskettes to the hard disk for convenience. This allows you to run the programs any time without having to insert a diskette. Copy the following files from the Reference diskette to your hard disk:

CORFIX.EXE	HDSIT.COM
ESPEED.EXE	HDSIT.VER

(Chapter 2 and Appendix B explain how to use these programs.)

The Reference diskette also contains files for the System diagnostics program. Because you should always run this program from the Reference diskette, do not copy these files to your hard disk.

The Utility diskettes contain VGA drivers that allow you to display graphics in certain high-resolution modes. If you want to use any of these extended modes on your VGA monitor, copy any VGA files you need to your hard disk. See the *VGA Utilities Guide* for instructions.




Note

Be sure to make backup copies of your Reference and Utility diskettes.





Special Keys on the Keyboard

Certain keys on your keyboard serve special functions when your computer is running your operating system or application programs, as described in the table below.

Special key functions

Key	Purpose
	Moves the cursor one tab to the right in normal mode and one tab to the left in Shift mode.
	Changes the letter keys from lower- to uppercase; changes back to lowercase when pressed again. The numeric/symbol keys on the top row of the keyboard and the symbol keys in the main part of the keyboard are not affected.
	Produces uppercase characters or the top symbols on the keys when used with the main character keys. Produces lowercase characters when the Caps Lock function is on.

Special key functions (continued)

Key	Purpose
Ctrl	Works with other keys to perform special (control) functions, such as editing operations in MS-DOS and various application programs.
Alt	Works with other keys to enter alternate character codes or functions.
Backspace	Moves the cursor back one space, deleting the character to the left of the cursor.
Enter	Ends a line of keyboard input or executes a command.
Insert	Turns the Insert function on and off.
Delete	Deletes the character marked by the cursor.
Home , End Pg Up , Pg Dn  ,   , 	Control cursor location.
NumLock	Changes the function of the numeric/cursor keys from entering numbers to positioning the cursor; changes back when pressed again.
Esc	Cancels the current command line or operation.
F1 - F12	Perform special functions within application programs.
Print Screen (PrtSc)	Prints the screen display on a printer.
Sys Req (Req)	Generates the System Request function in some application programs (used with Alt).
Scroll Lock	Controls scrolling in some applications.
Pause	Suspends the current operation.
Break	Terminates the current operation (when used with Ctrl).

The **Caps Lock**, **Num Lock**, and **Scroll Lock** keys work as toggles; press the key once to turn on a function and again to turn it off. When the function is enabled, the corresponding light in the upper right corner of the keyboard is on.

Stopping a Command or Program

You may sometimes need to stop a command or program while it is running. If you have entered an MS-DOS command that you want to stop, try one of the following commands:

- Hold down the **Ctrl** key and press **C**
- Hold down the **Ctrl** key and press **Break**.

These methods may also work in your application program. If not, you may need to reset the computer as described below.

Caution

Do not turn off the computer to stop a program or command because the computer erases any data you did not save.

Resetting the Computer

Occasionally, you may want to clear the computer's current settings or its memory without turning it off. You can do this by resetting the computer.

For example, if an error occurs and the computer does not respond to your keyboard entries, you can reset it to reload your operating system and try again. However, resetting erases any data in memory that you have not saved; so reset only if necessary.

Caution

Do not reset the computer as a means to exit a program. Some programs classify and store new data when you exit them in the normal manner. If you reset the computer without properly exiting a program, you may lose data.

To reset the computer, the operating system must be either on the hard disk or on a diskette in drive A; so if you do not have a hard disk, insert the system diskette in drive A.

There are two ways to reset the computer:

- ❑ If you are using MS-DOS, hold down **Ctrl** and **Alt** and press the **Delete** key. The screen goes blank for a moment and then the computer should reload MS-DOS. If it doesn't, try the next method.
- ❑ Press the **RESET** button on the front panel. This method works even when the computer does not respond to your keyboard entries.

If resetting the computer does not correct the problem, you probably need to turn it off and reboot it. Remove any diskette(s) from the diskette drive(s). Turn off the computer and wait five seconds. If you do not have a hard disk, insert the system diskette in drive A. Then turn on the computer.

Using a Power-on Password

If you set a power-on password when you ran the SETUP program, you must enter it every time you turn on or reset the computer. Follow these steps to use your password:

1. If you do not have a hard disk, insert your system diskette in drive A.
2. Turn on the computer or press **RESET**. After the computer completes its memory test, the screen displays the following prompt:

Enter **Password** :

3. Type your password at the prompt. The screen does not display the characters you type. Then press **Enter**.

After you type the password correctly and press **Enter**, you see the **Press to start SETUP prompt**. If you do not press **Delete**, the computer loads your operating system and displays the command prompt.

If you do not enter the correct password the first time, press **Enter** and try again.

Note

If you turned on network server mode when you ran the SETUP program, see “Using Your Computer as a Network Server” in Chapter 2 for instructions on using the power-on password.

If you want to change or delete your current password, you must run the SETUP program. See Chapter 2 of the Setup *Guide* for instructions. If you do not know the correct password, see “Password Problems” in Appendix C.

Using Disks and Disk Drives

The disk drives in your computer allow you to store data on disk, and then retrieve and use your stored data. This section explains how disks work and tells you how to:

- ❑ Use different types of diskettes and diskette drives
- ❑ Care for your diskettes and diskette drives
- ❑ Write-protect diskettes
- ❑ Use a single diskette drive system
- ❑ Insert and remove diskettes
- ❑ Format diskettes
- ❑ Make backup copies
- ❑ Use a hard disk drive.

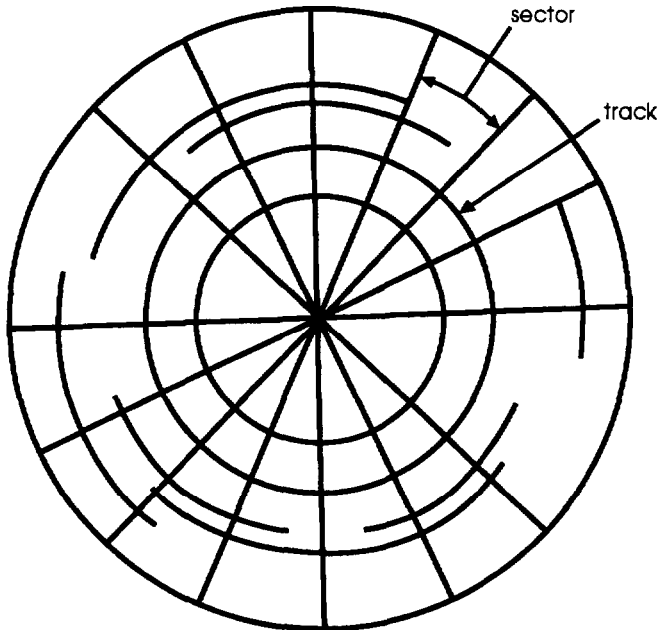
How Disks Store Data

Diskettes are made of flexible plastic coated with magnetic material. This plastic is enclosed in a square jacket that is either slightly flexible (5¼-inch diskette) or hard (3½-inch diskette).

Unlike a diskette, a hard disk is rigid and fixed in place. It is sealed in a protective case to keep it free of dust and dirt. A hard disk stores data the same way that a diskette does, but it works much faster and has a much larger storage capacity.

All disks are divided into data storage compartments by sides, tracks, and sectors. Double-sided diskettes store data on both sides. On each side are concentric rings, called tracks, on which a disk can store data.

A disk is further divided by sectors, which can be visualized as pie slices. The figure below provides a simple representation of tracks and sectors.



Double-sided, double-density diskettes have either 40 or 80 tracks on each side, and double-sided, high-density diskettes have 80 tracks on each side. Diskettes can have 8,9,15, or 18 sectors per track.

A hard disk consists of two or more platters stacked on top of one another and thus has four or more sides. In addition, a hard disk has many more tracks per side than a diskette, but the number of tracks depends on the capacity of the hard disk. The number of sectors depends on the type of hard disk.

Your computer uses the read/write heads in a disk drive to store and retrieve data on a disk. To write to a disk, the computer spins it in the drive to position the disk so that the area where the data is to be written is under the read/write head. A diskette has an exposed area where the read/write head can access it.

Because data is stored magnetically, you can retrieve it, record over it, and erase it just as you play, record, and erase music on a cassette tape.

Types of Diskette Drives

The following list describes the four types of diskette drives you can use in your computer and which diskettes to use with them:

- ❑ 1.44MB drive-Use 3½-inch, double-sided, highdensity, 135 TPI (tracks per inch), 1.44MB diskettes. These diskettes contain 80 tracks per side, 18 sectors per track, and hold up to 1.44MB of information (approximately 600 pages of text).

Note

MB stands for megabyte, which equals 1024KB (or 1,048,576 bytes). KB stands for kilobyte, which equals 1024 bytes. Each byte represents a single character, such as A, \$, or 3.

- ❑ 1.2MB drive-Use 5¼-inch, double-sided, high-density, 96 TPI, 1.2MB diskettes. These diskettes contain 80 tracks per side, 15 sectors per track, and hold up to 1.2MB of information (approximately 500 pages of text).

- ❑ 720KB drive-Use 3½-inch, double-sided, doubledensity, 135 TPI, 720KB diskettes. These diskettes contain 80 tracks per side, 9 sectors per track, and hold up to 720KB of information (approximately 300 pages of text).
- ❑ 360KB drive-Use 5¼-inch, double-sided, doubledensity, 48 TPI, 360KB diskettes. (You can also use single-sided, 160KB or 180KB diskettes.) These diskettes contain 40 tracks per side and 8 or 9 sectors per track. With 8 sectors per track, a diskette holds up to 320KB. With 9 sectors per track, a diskette holds up to 360KB of information (approximately 150 pages of text).

Note

You must format a new diskette before you can store data on it. See “Formatting Diskettes,” later in this section.

Drive and diskette incompatibilities

If your computer has more than one type of diskette drive, or if you use different types of diskettes, you need to be aware of certain incompatibilities between the drives and diskettes.

Because of the type and size differences, you cannot use a **3½-inch** diskette in a **5¼-inch** drive or vice versa. There are also limitations on using diskettes that are the same size as the drive but have different capacities. The following tables summarize the possibilities and limitations.

5¼-inch drive/diskette compatibility

Drive type	Diskette types it can read from and write to
360KB	360KB, 320KB, 180KB, 160KB
1.2MB	1.2MB, 360KB,* 320KB,* 180KB,* 160KB*

- * If you write to this diskette in a 1.2MB drive, you may not be able to read it or write to it in a 360KB drive later.

3½-inch drive/diskette compatibility

Drive type	Diskette types it can read from and write to
720KB	720KB
1.44MB	1.44MB, 720KB

Because of these incompatibilities, always indicate the diskette type and density when you label your diskettes. (Usually this information appears on the manufacturer's label.)

If you have any combination of the above drives (1.44 MB, 1.2MB, 720KB, or 360KB) and you are using MS-DOS, you can copy files from one drive to another—using COPY or XCOPY—as long as the correct diskette type is in each drive. You can also use these commands to copy files between a hard disk and any type of diskette. However, you cannot use the MS-DOS DISKCOPY command to copy from one diskette drive to another if the two drives are not the same type. For more about copying files and diskettes, see your MS-DOS or other operating system manuals.

Note

If you format a 720KB diskette in a 1.44MB drive, make sure you include the correct parameter in your format command. See your operating system manual for instructions.

Caring for Diskettes and Diskette Drives

Follow these basic precautions to protect your diskettes and avoid losing data:

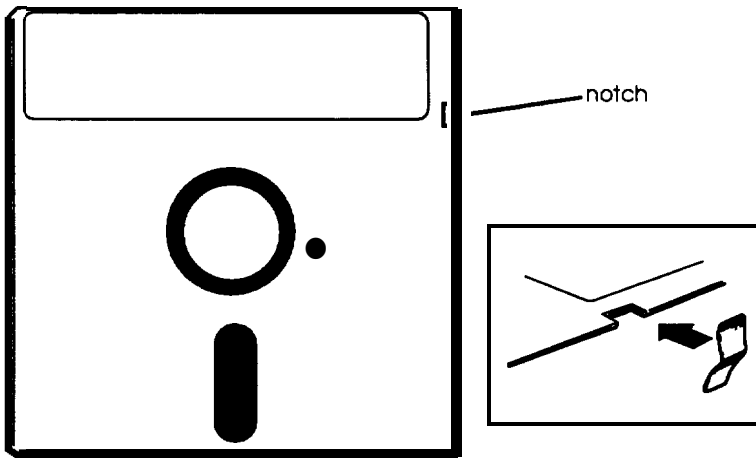
- ❑ If you have a diskette that contains data you don't want to accidentally write over or erase, be sure you write-protect it. This is especially important for your operating system and application program diskettes. See "Write-protecting Diskettes," below, for more details.
- ❑ Do not remove a diskette from the diskette drive or reset or turn off the computer while the drive light is on. This light indicates that the computer is copying data to or from a diskette. If you interrupt this process, you can destroy data.
- ❑ Remove all diskettes before you turn off the computer.
- ❑ Keep diskettes away from dust and dirt. Small particles of dust or dirt can scratch the magnetic surface, destroy data, and ruin the read/write heads in a diskette drive.
- ❑ Never wipe, brush, or try to clean diskettes in any way.
- ❑ Keep diskettes in a moderate environment. Don't leave diskettes sitting in the sun or in extreme cold or heat.
- ❑ Keep diskettes away from magnetic fields, such as electrical appliances, telephones, and loudspeakers. (Diskettes store information magnetically.)
- ❑ Do not place diskettes on top of your monitor or near an external hard disk drive.
- ❑ Always hold a **5¼-inch** diskette by its protective jacket and never touch the magnetic surface (exposed by the read/write slot). The oils on your fingertips can damage it.

- ❑ Do not place anything on top of your diskettes, and be sure they do not get bent.
- ❑ Carefully label your diskettes and indicate the type and density. Attach the label only along the top of a diskette (next to the manufacturer's label). Do not stick several labels on top of one another; this can make it difficult to insert and remove the diskette in the drive.
- ❑ Write on a diskette label before you attach it to the diskette. If you need to write on a label that is already on the diskette, use only a soft-tip pen-not a ballpoint pen or a pencil.
- ❑ Store diskettes in their protective envelopes and in a proper location, such as a diskette container. Do not store diskettes flat or stack them on top of each other.

Write-protecting Diskettes

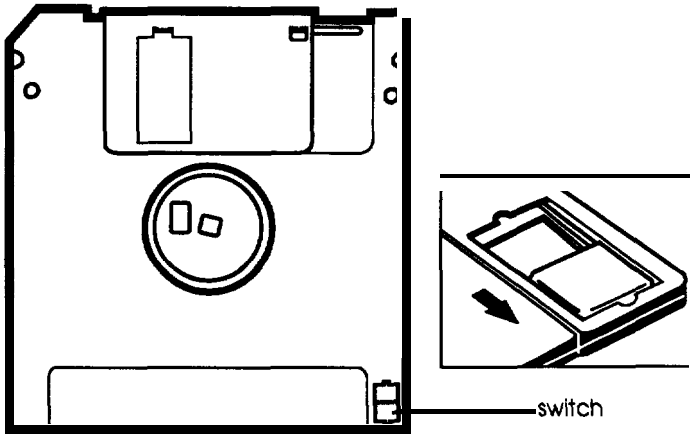
You can write-protect a diskette to prevent its data from being altered. When a diskette is write-protected, you can read it and copy data from it, but you cannot store new data on it or delete any files it contains.

To write-protect a 5¼-inch diskette, cover the small, rectangular notch (shown below) with an adhesive write-protect tab. Write-protect tabs usually are included in a new package of blank 5¼-inch diskettes.



To remove the write protection, peel off the write-protect tab.

On a 3½-inch diskette, the write-protect device is a small switch on the back of the diskette in the lower right corner, shown below. To write-protect a 3½-inch diskette, slide the switch toward the edge of the diskette until it clicks into position, exposing a hole in the corner.



To remove the write protection, slide the switch toward the center of the diskette until it clicks into position and the hole is covered.

Note

Some program diskettes have no notch or switch so they are permanently write-protected. This protects them from being accidentally erased or altered.

Using a Single Diskette Drive System

Most operating systems expect the computer to have at least two diskette drives and display prompts and messages accordingly. MS-DOS, for example, recognizes the first diskette drive (the top drive) as drive A and a second diskette drive as drive B. If you have only one diskette drive, MS-DOS can treat it as both A and B when you need to perform operations that normally require two diskette drives.

For example, if you enter a command to copy data from A to B, MS-DOS copies the data from the first diskette you place in the drive (which would be drive A) to the computer's memory. Then MS-DOS prompts you to insert another diskette (for drive B) and copies the data from memory to the new diskette. When copying is complete, you see a prompt to insert the original diskette (A).

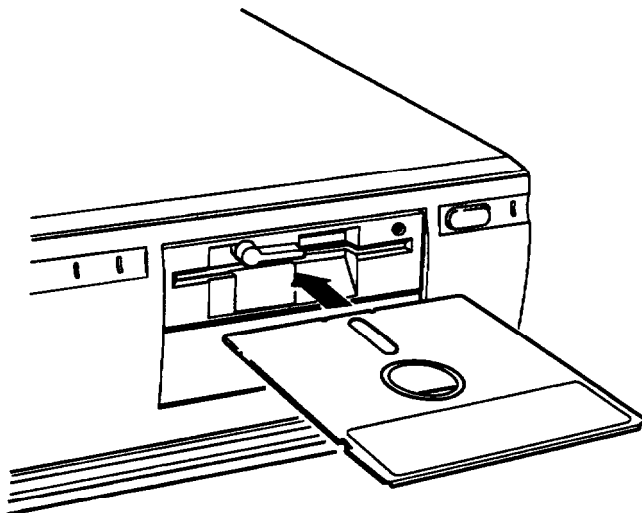
Because you may often swap diskettes this way, it is important to remember which diskette is which. It is also a good idea to write-protect your original diskette. See "Write-protecting Diskettes," above.

If you have a hard disk and one diskette drive, you can load the operating system and application programs from the hard disk, create and store your data there, and use the diskette drive just for copying data to or from diskettes.

However, if you have only one diskette drive and no hard disk, you need to use that drive to load the operating system as well as any application program you are using. First, insert the operating system diskette (the Startup diskette, for example) in drive A and load the operating system; this copies it to the computer's memory (RAM) so you do not need to leave the system diskette in the drive. Then remove the system diskette and insert your application program diskette to load that data into memory, too. See your application program manual for detailed instructions.

Inserting and Removing Diskettes

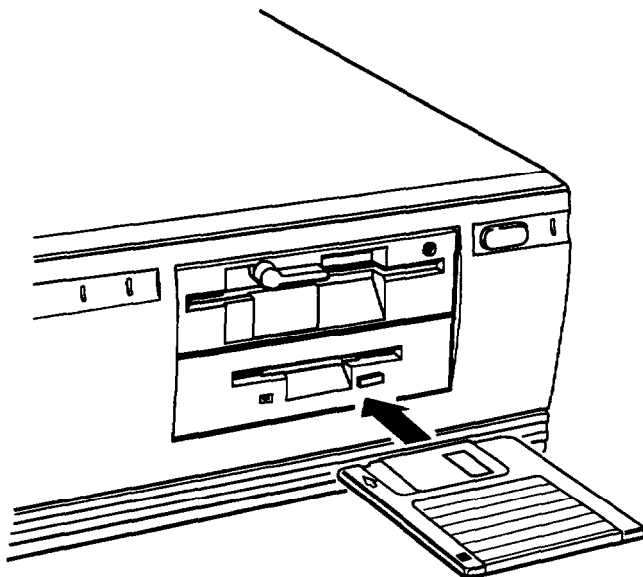
If you have a 5¼-inch diskette drive, insert a diskette as follows: hold the diskette with the label facing up and the read/write slot leading into the drive, as shown below.



Slide the diskette all the way into the slot. Then turn the latch down to lock it in a vertical position. This keeps the diskette in place and enables the read/write heads in the drive to access the diskette.

When you want to remove a diskette, first make sure the disk drive light is off. Then flip up the latch and carefully pull out the diskette. Place it in its protective envelope and store it in a proper location, such as a diskette container.

If you have a 3½-inch diskette drive, insert the diskette with the label facing up and the metal shutter leading into the *drive*, as shown in the following illustration. Slide the diskette into the drive until it clicks into place.



When you want to remove the diskette, make sure the drive light is off; then press the release button. When the diskette pops out, remove it and store it properly.

Caution

Never remove a diskette or reset or turn off the computer while a diskette drive light is on. You could lose data. Also, remove all diskettes before you turn off the computer.

Formatting Diskettes

Before you can store data on a new diskette, you must format it. Formatting prepares the diskette so that the operating system can write data on it. You need to do this only once, before you use the diskette for the first time.

You can also reformat previously used diskettes to store new data. This process erases all the data on the diskette, so be sure you do not want to save any of the files on a used diskette before you format it. See your operating system manual for instructions on formatting diskettes.

Making Backup Copies

It is important to make copies of all your data and system diskettes. Make backup (or working) copies of all diskettes that contain programs, such as your operating system, Reference, and Utility diskettes; then use only the copies. Store the original diskettes away from your working diskettes. Also, copy your data diskettes regularly, whenever you revise them, and store them away from your originals.

If you have a hard disk, you'll probably use it to store the programs and data files you use regularly. Keep backup copies of all your files on diskettes or tapes.

Using a Hard Disk Drive

Using a hard disk is similar to using a diskette. However, the hard disk provides several advantages:

- ❑ A 40MB hard disk can store as much data as approximately thirty-three 1.2MB diskettes, and a 100MB hard disk can store as much data as approximately eighty-two 1.2MB diskettes.
- ❑ Your computer can perform all disk-related operations faster.
- ❑ You can store frequently used programs and data files on the hard disk, eliminating the inconvenience of swapping diskettes to access different files.

The added storage capacity makes it easy to move back and forth between different programs and data files. However, because it is so easy to add programs and files to your hard disk, you may find yourself trying to organize hundreds of files.

Most operating systems let you keep related files together in directories and subdirectories so they are easy to find and use. See your operating system manual for instructions on managing your files and directories.

Note

A hard disk must be partitioned and formatted before you can use it. Be sure you have performed the procedures described in your operating system manual to prepare your hard disk for use.

Backing up the hard disk

While the hard disk is very reliable, it is essential to back up your hard disk files to diskettes or tapes in case you lose some data accidentally. Make copies of all your system and application program diskettes before copying the programs to the hard disk. After you create data files on the hard disk, be sure to copy them whenever you revise them to keep your backup diskettes or tapes up-to-date.

Caring for your hard disk

Follow these precautions to protect your hard disk drive from damage and to avoid losing data:

- ❑ Never turn off or reset the computer when the hard disk access light is on. This light indicates that the computer is copying data to or from the hard disk. If you interrupt this process, you can lose data.
- ❑ Never attempt to open the hard disk drive. The disk itself is enclosed in a sealed container to protect it from dust.
- ❑ Before you move your computer even a short distance, you may need to run the HDSIT program to prepare the hard disk for moving, as described below.



Preparing the hard disk for moving

If you need to move your computer to a new location, you may want to run the HDSIT program provided on your Reference diskette to protect the hard disk during the move.

HDSIT moves (or parks) the disk drive's read/write heads to a region on the disk surface that does not contain data, and locks them securely in position. This protects the hard disk from being damaged if the computer is bumped accidentally.

Many hard disk drives, including all Epson drives, automatically park their heads when you turn off the computer. If your hard disk drive does not do this, or if you are not sure that it does, be sure to run HDSIT.

Follow these steps to run HDSIT:

1. If you copied the HDSIT.COM and HDSIT.VER files to your hard disk, log onto the directory where they are stored. If you did not copy the files to the hard disk, insert the Reference diskette in drive A. Then type A : and press  to log onto that drive.
2. Type HDSIT and press .

You see a message on the screen that tells you the disk drive's read/write heads will remain locked until you reset the computer or turn the power off and on again. The computer locks the heads and disables the keyboard. Remove any diskettes and turn off the computer. You are now ready to move it to the new location.

Chapter 2

Enhancing System Operations

This chapter tells you how to use the following procedures to enhance the operation of your computer:

- ❑ Using AUTOEXEC.BAT and other batch files
- ❑ Changing the processor speed
- ❑ Using your computer as a network server
- ❑ Using special VGA features.

Using AUTOEXEC.BAT and Other Batch Files

If you are using MS-DOS to access your application programs, you may find that there are commands you need to run frequently. You can automate the execution of these commands by listing them in a special file called a batch file. When you type the name of the batch file and press **Enter**, MS-DOS executes the commands in the file just as if you had typed each command from the keyboard.

If you have a word processing program that can save a file as a text-only file (sometimes called an ASCII file), you can use it to create a batch file. You can also use the MS-DOS COPY, EDIT, or EDLIN command, or a text editor, to create the file.

One batch file that you may find particularly useful is called AUTOEXEC.BAT. Every time you turn on your computer, MS-DOS looks for the AUTOEXEC.BAT file and automatically executes each of the commands in the file.

When you install MS-DOS, it creates an AUTOEXEC.BAT file for you, which you can modify or replace as described above. Be sure to name the file AUTOEXEC.BAT and store it in the root directory of the hard disk or diskette from which you load MS-DOS.

See your MS-DOS manuals for more information about creating and using batch files.

Changing the Processor Speed

Your computer's processor can operate at two speeds: fast (33 MHz) and slow (simulated 11 MHz). At fast speed, the computer can access memory faster. This is the default setting unless you change the speed to slow with SETUP or the ESPEED program or set it to change automatically.

Note

When your computer is operating at fast speed, the **TURBO** light on the front panel is on. It is off when the computer is operating at slow speed.

You should use fast speed for almost everything you do because your programs will work faster. However, certain application programs have specific timing requirements and can run only at the slower speed. See your software manual to determine if this is the case.

Some copy-protected programs require the computer to run at slow speed while accessing the program on a diskette. These programs also usually require you to leave a *key* disk—the one that contains the copy protection—in the drive. If you use a copy-protected program often, you may want to set your processor speed to change automatically to slow speed when accessing the diskette and return to fast when it is finished.

Depending on the type of program you have, you may or may not want to set the processor to auto speed. Follow these guidelines:

- ❑ If you are using a copy-protected program that can run only on a diskette or that requires a key disk, try to load the program at fast speed. If this works, you do not need to set the speed to change automatically. If you can't load the program at fast, set the speed to change automatically.
- ❑ If you are using a copy-protected program that does not require a key disk but requires a special procedure to install it on a hard disk, set the speed to slow while you are installing the program. Then set the speed to fast while you load and run the program.

If this does not work, try installing *and* loading the program at slow speed and then change to fast speed to run it. Do not set the speed to change automatically.

There are three ways to change the processor speed:

- ❑ Run the SETUP program
- ❑ Enter a keyboard command
- ❑ Run the ESPEED program.

If you frequently use programs that require slow or automatic speed, use SETUP to change the processor speed. See Chapter 2 of the *Setup Guide* for instructions.

If you use these programs only occasionally, you should use the keyboard commands or the ESPEED program (described below) to change the processor speed.

Entering Keyboard Commands

You can change the processor speed by entering one of the commands shown in the following table.

Speed setting commands

Numeric keypad commands	Speed setting
Ctrl Alt +	33 MHz
Ctrl Alt -	11 MHz

To enter these commands, hold down the **Alt** key and the **Ctrl** key simultaneously and then press the **+** or **-** key. Use the **+** or **-** key on the numeric keypad.

Note

You can use the commands listed above while you are running a program. However, if the program uses one of the same commands for another function, you cannot use it to change the processor speed. For example, if you are running a program that uses the **Ctrl** **Alt** **-** command to move the cursor, you cannot enter **Ctrl** **Alt** **-** to change the processor speed to slow. Another alternative is to use the ESPEED program, described below.

The speed setting remains in effect until you press the **RESET** button or turn off the computer, or until you change it again using the **SETUP** program, another keyboard command, or the **ESPEED** program.

Using the ESPEED Program

ESPEED provides an easy way to change the processor speed if your application program does not recognize the **Ctrl** key commands or if you want to include the program command in a batch file.

The ESPEED program is provided on the Reference diskette. If you copied this file onto your hard disk, log onto the drive where it is stored. If you do not have a hard disk, insert your Reference diskette in drive A and log onto drive A before you enter the command to start the program.

For help information on how to run the ESPEED program, type the following at the command prompt and press **Enter**:

```
ESPEED ?
```

You see this display:

```
Format: ESPEED [F|S|?]
```

```
No Parm      :Displays current CPU Speed
F            :Set to Fast Speed
S            :Set to Slow Speed
?           :Help Message
```

The message tells you the switches you should use to set the speed to fast or slow. For example, to select slow speed, type the following and press **Enter**:

```
ESPEED S
```

To change the processor speed back to fast, enter this command:

```
ESPEED F
```

To display the current CPU speed, type **ESPEED only** and press **Enter**. You see the following:

```
33.0 MHZ          <+>   : Speed Up
                  <->   : Speed Down
                  <Esc> : Exit
```

To **change** the speed when **you s**ee this display, press the **+** or **-** key; then press **Esc** to exit.

The processor speed you set remains in effect until you change it using the **ESPEED** program again, a keyboard command, or the **SETUP** program; or until you press the **RESET** button or turn off the computer.

Entering the ESPEED command in a batch file

You may want to run the **ESPEED** program by including the command in a batch file. Let's say you have a program called **SLOWDOWN** which requires a slower processor speed. You could include the following commands in a batch file to start the **SLOWDOWN** program:

```
ESPEED S
SLOWDOWN
```

You could name the batch file **SLOW.BAT**. Whenever you **need** to run the **SLOWDOWN** program, insert the program diskette in drive A. Then type **SLOW** and press **Enter**. The computer changes the speed to slow and starts the **SLOWDOWN** program.

See your operating system manuals for instructions on creating and using batch files.

Using Your Computer as a Network Server

A network sever is the master computer in a network and provides storage space for the other computers connected to it. It can also write files to and read files from the other computers.

Even if no one is typing commands at the network server keyboard, the server can process commands sent to it from other computers. If you use your computer as the network server, you may want to prevent unauthorized users from entering commands at the keyboard. To provide this security, you can enable a power-on password in network server mode using the SETUP program.

If you set a power-on password but do not turn on network server mode, you enter the password before the computer loads the operating system or the network software. Once you load it, anyone can access your system by typing commands on the keyboard. However, if you set a password and turn on network server mode, you can load your operating system or network software before you enter the password. This allows other computers in the network to access the system, but prevents unauthorized users from entering commands at your keyboard and using any network server access privileges.

When you boot the computer in network server mode, you do not see the password prompt (_), as you would if network server mode was turned off. The prompt is hidden to prevent unauthorized users from knowing that a password is required.

You do not have to set a password in network server mode to use your computer as a network server, but it is helpful. See “Setting the Power-on Password” in Chapter 2 of the *Setup Guide* for instructions on setting the password and enabling network server mode. Then read the next section to use your network password.

Note

If your hard disk drive has a partition larger than 32MB and you are using MS-DOS, you must use the MS-DOS SHARE command to install file sharing and locking protection in a network environment. See your MS-DOS manual for instructions.

If you do not install SHARE, the following message flashes on your screen after you install your network software and reboot your computer:

WARNING! SHARE should be loaded for large media

Using a Password in Network Server Mode

When you turn on or reset the computer, it loads your operating system or network software and you see either the command prompt or the first screen displayed by your network software.

Follow these steps to enter your password:

1. Turn on or reset your computer. You do not see the password prompt even though the computer is now waiting for you to enter the correct password.
2. Type your password and press **Enter**. The screen does not display what you type.

Now you should be able to use your computer. Press a key such as **Enter** to see if the keyboard accepts your command. If you entered an incorrect password, the **computer** does not respond. Type the correct password, press **Enter**, and try using the computer again.

Note

You cannot change or delete a power-on password in network server mode. You must run SETUP and turn off network server mode first. See Chapter 2 of the *Setup Guide* for instructions. Then you can change or delete the password as described in Chapter 1 of this manual.

Using Special VGA Features

Your built-in VGA (video graphics array) display adapter supports both standard VGA monitors and multifrequency monitors with analog connectors. The VGA adapter operates in all standard VGA resolutions without requiring any device drivers. However, if you are using a monitor that supports extended VGA features, you may want to use one or more of the device drivers provided on the Utility diskettes.

Note

If you are using your computer's VGA feature connector and **a high-resolution graphics adapter card, you may also want to use the device drivers on the Utility diskettes.**

Install VGA device drivers if you want to use these features:

- Resolutions up to 800 x 600 or 1024 x 768 (non-interlaced) in graphics modes with 16 colors
- Resolutions up to 640 x 480 in graphics modes with 256 colors
- 132-column text mode in 16 colors
- Graphics cursor movement performed by the built-in VGA hardware.

To use graphic display drivers in 800 x 600 or 1024 x 768 resolutions, you must have a multifrequency monitor capable of displaying these resolutions. Standard VGA monitors cannot display them.

You can use the VGA utilities (also provided on the Utility diskettes) to take advantage of other special features of your VGA adapter. Even if you do not use any device drivers, you may want to install some of the VGA utilities. For complete instructions on installing and using the VGA device drivers and utilities, see *the VGA Utilities Guide*.

Chapter 3

Accessing Internal Components

To reach your computer's internal components, you need to remove the cover. In some cases, you may also need to remove the front panel and the subassembly (the metal case that holds the drive bays and the power supply). The instructions in this chapter explain how to do these tasks:

- ❑ Remove and replace the cover
- ❑ Remove and replace the subassembly.

Be sure to heed all the cautions and warnings so you do not injure yourself or damage the computer. If you have any reservations about performing these steps yourself, ask your Epson dealer for assistance.

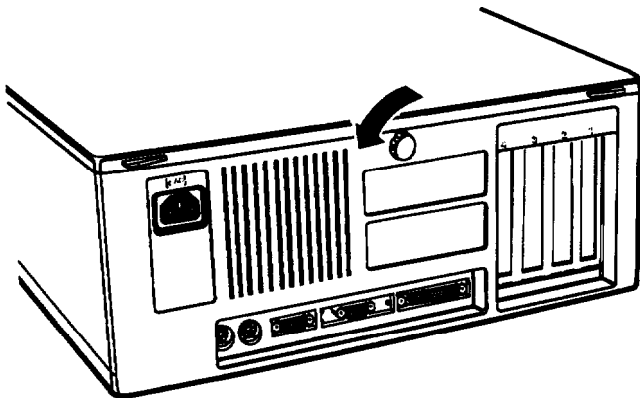
Note

You only remove the subassembly to access the math coprocessor or SIMM sockets, or to install or remove a disk drive. You do not need to remove it to install or remove an option card.

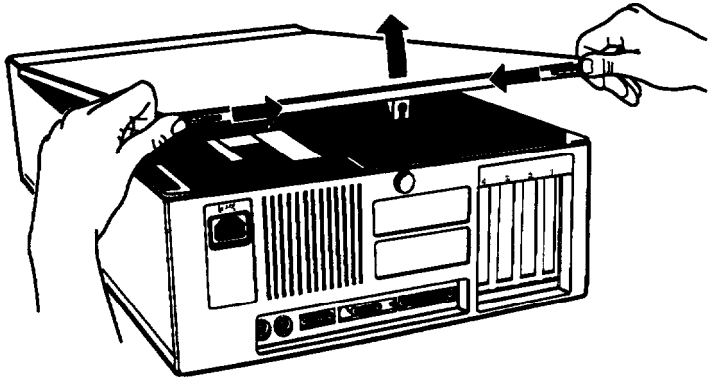
Removing the Cover

To access any internal components, you need to remove the computer's cover. Follow these steps:

1. Turn off the computer and then any peripheral devices (including the monitor and printer).
2. Disconnect the computer's power cable from the electrical outlet and from the back panel. Also disconnect any cables that are connected to the computer, including the keyboard cable.
3. If the monitor is on top of the computer, lift it off and set it to one side.
4. Turn the computer around so you are facing the back panel. The cover is secured by a large screw on the back panel, as shown below. Turn the screw counterclockwise to unlock the cover.

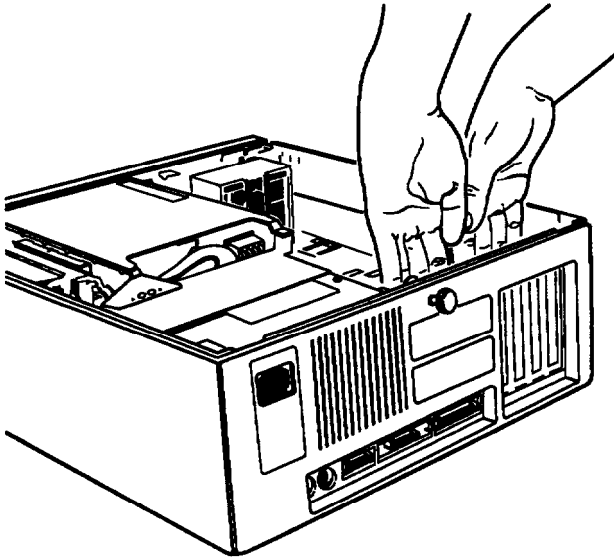


5. The cover is also secured by two latches on the back, near the corners. Press both latches inward and then lift up the cover from the back panel. You might meet some resistance from the grounding tabs along the inside of the cover.



6. Pull the cover away from the front of the computer to completely remove it. Then set it aside.

7. Before you touch any of the components, touch the inside of the computer's back panel, as shown below, to ground yourself and avoid an electric shock.

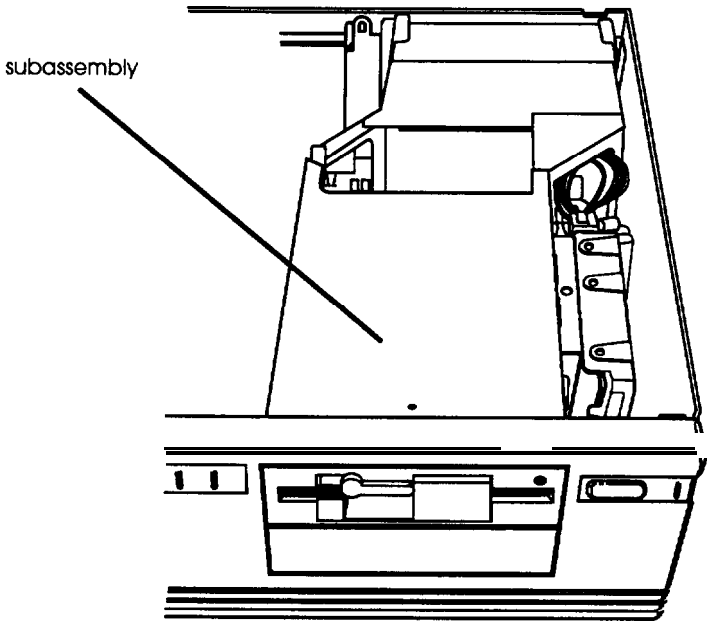


WARNING

Be sure to ground yourself to the inside back panel of the computer every time you remove the cover. If you are not properly grounded, you could generate an electric shock when you touch a component.

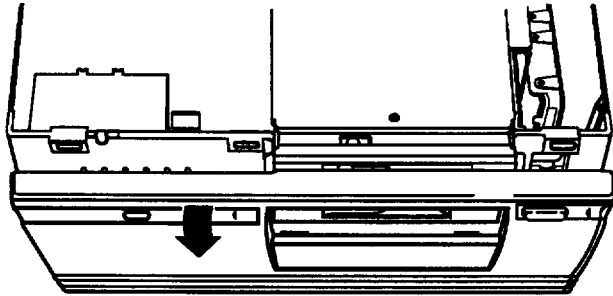
Removing the Subassembly

You need to remove the subassembly to install or remove disk drives, or to access the SIMM or math coprocessor sockets on your computer's main system board. The subassembly is the large metal casing that holds the horizontal drive bays and the power supply, as shown below.

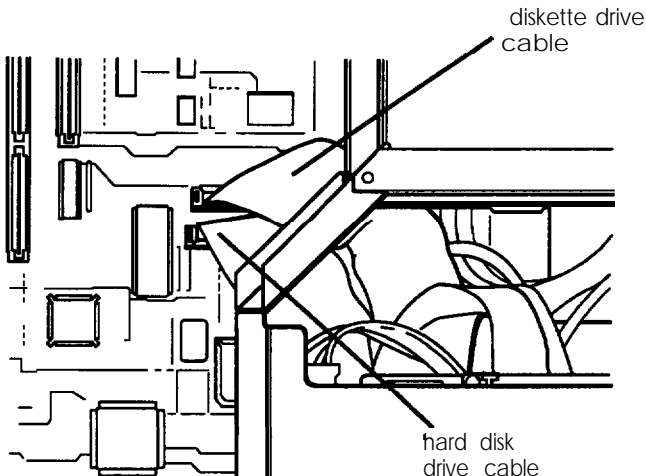


Follow these steps to remove the subassembly:

1. Remove the front panel from the computer by gently releasing the three tabs at the top of the panel and tilting it toward you. You may want to use a flat-blade screwdriver to release the tabs.

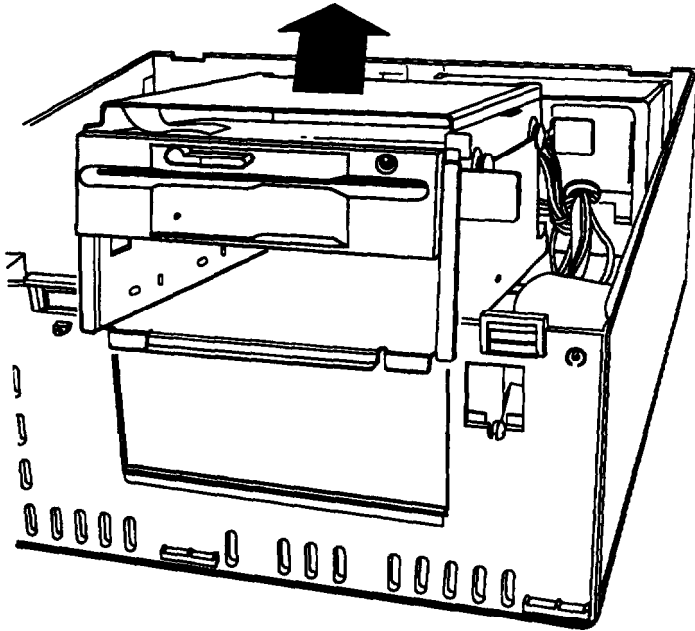


2. If you have a hard disk drive, the drive cable is connected to the main system board on the left side of the subassembly, as shown below.

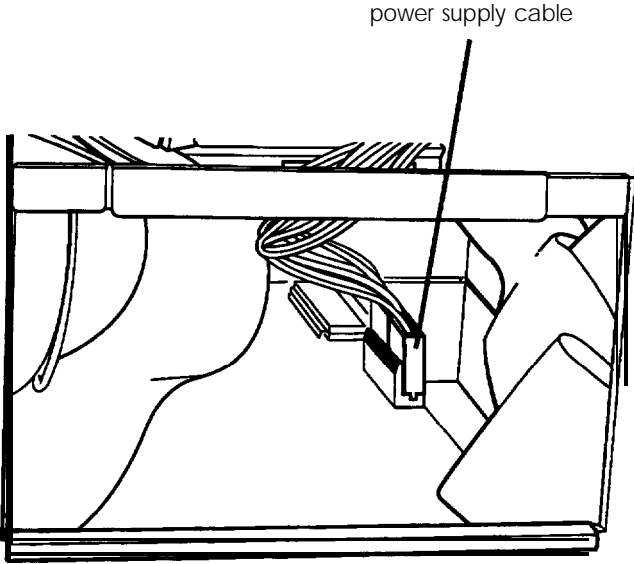


Grasp the hard disk connector and pull it straight up to remove it from the socket. Do not pull only on the cable.

3. The diskette drive cable is connected to the socket above the hard disk drive socket; disconnect it in the same manner.
4. To lift the subassembly from the front of the computer, place your thumbs under the diskette drive and raise the front of the subassembly. (If there is a diskette drive installed in the lower horizontal drive bay, place your thumbs underneath that drive instead.)



5. Reach back underneath the subassembly and disconnect the two power supply cables (labelled P4 and P5) connected to the right side of the main system board, as shown below. Pull each connector straight up. Do not pull only on the cables.

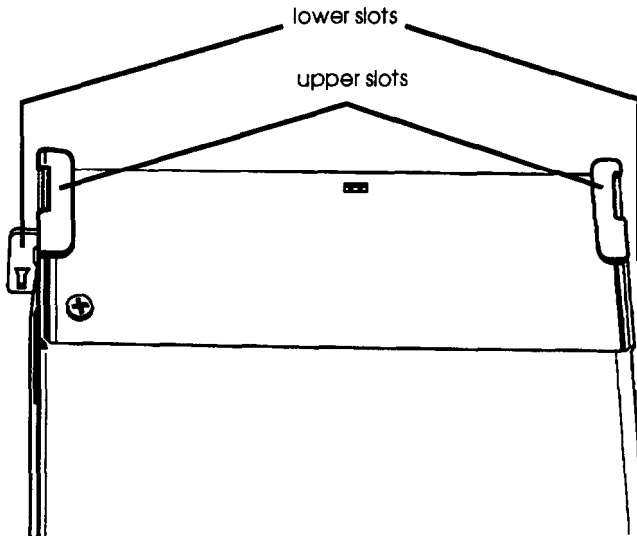


6. Lift the entire subassembly out of the computer and carefully place it on your work surface.

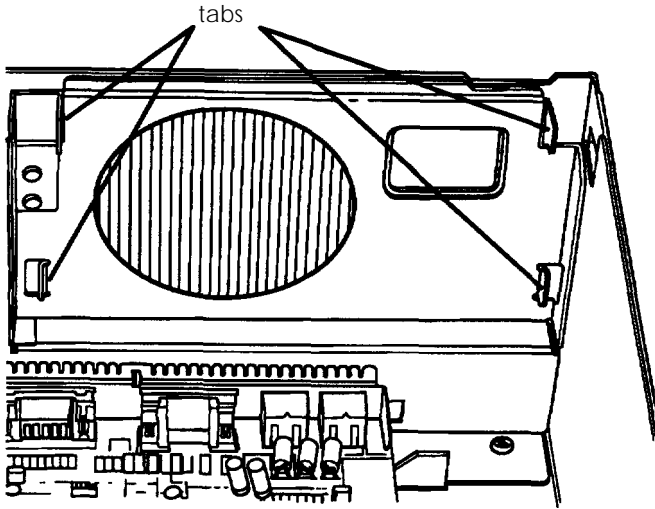
Replacing the Subassembly

Follow these steps to replace the subassembly:

1. Notice that there are four mounting slots on the back of the subassembly: two in the upper corners and two in the lower corners.

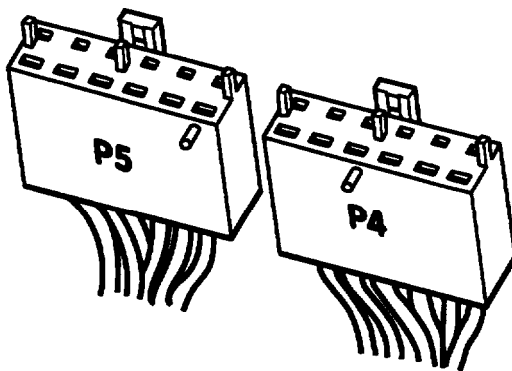


There are four corresponding tabs on the inside back panel of the computer which fit into the subassembly slots.

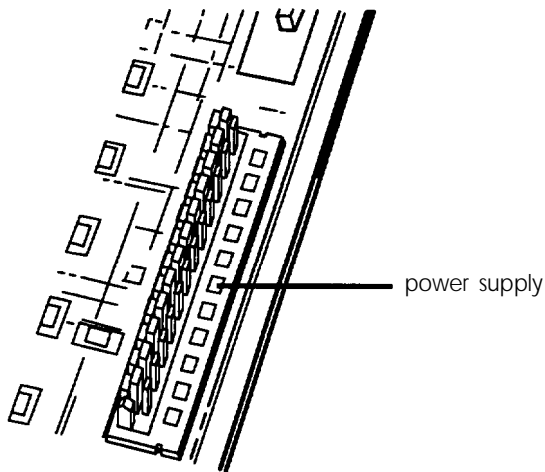


Lift up the subassembly from your work surface and lower the back end into the computer, guiding the tabs on the computer into the top slots.

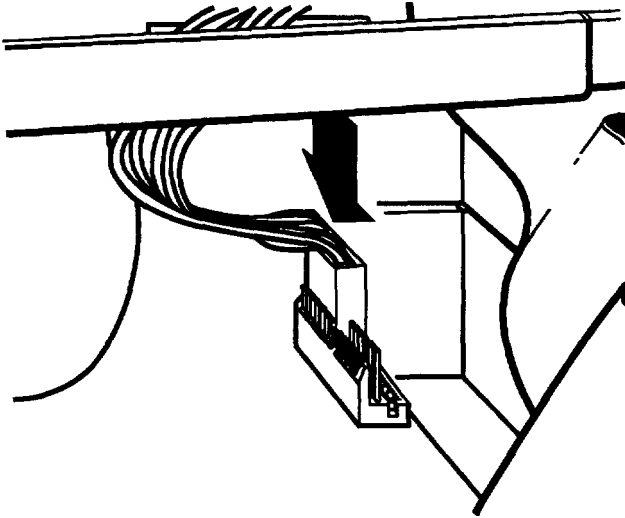
2. Hold up the front of the subassembly at a slight angle and arrange the ribbon cables so they curve underneath the subassembly and extend out its left side. Then grasp the two power supply cables, labelled P4 and P5. Each connector has six pin holes and a large tab on one side, as shown below.



There is a 12-pin power supply socket on the right side of the main system board (toward the back) that holds both of the power supply connectors, as shown below.



3. Position power supply connector P4 so the large tab on the connector faces the right side of the computer. Beginning with the six pins toward the back of the computer, carefully line up the holes in the connector with the pins in the socket and then push in the connector.

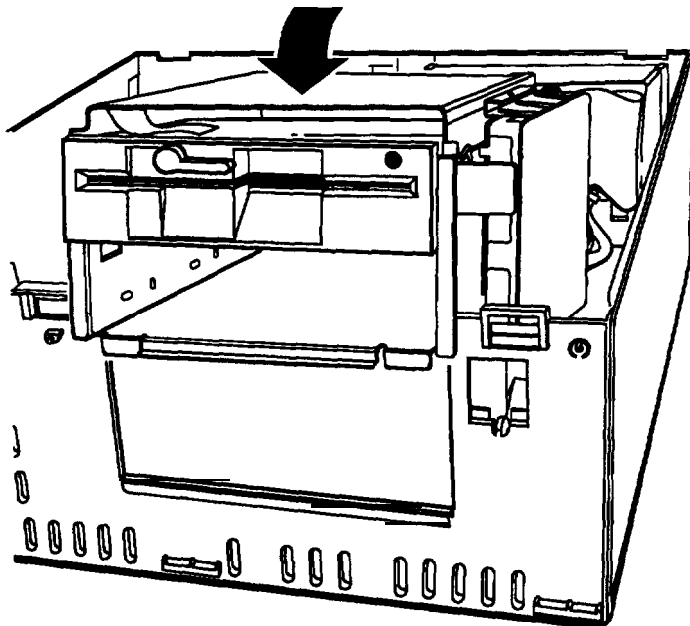


Caution

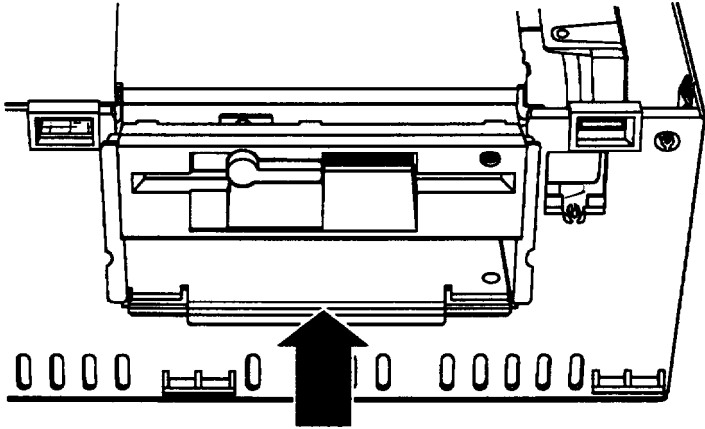
If you do not correctly align the holes with the pins in the socket, you could severely damage your computer when you push in the connector.

4. Connect power supply connector P5 to the remaining six pins in the socket using the same procedure.

5. Carefully lower the front of the subassembly onto the computer. Make sure that all four tabs on the back of the computer are inserted into the slots on the subassembly.

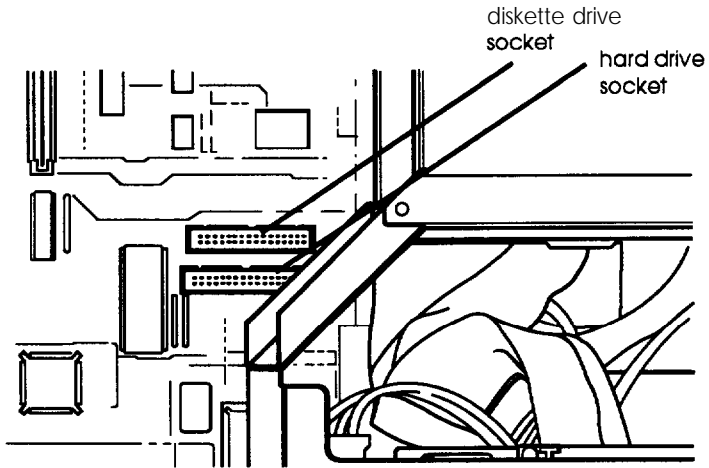


Guide the front of the subassembly over the opening in the front of the computer so the two small tabs sit behind the opening and the large tab with the curved lip extends over the opening. If necessary, press on the large tab until the subassembly snaps into place.

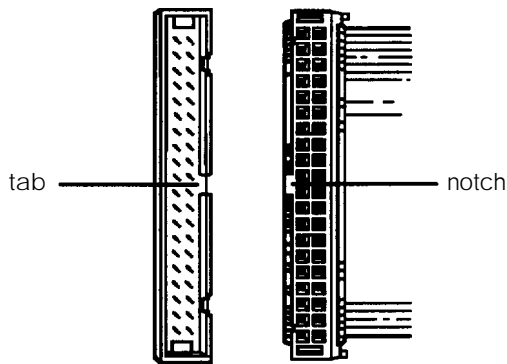


6. Locate the hard disk drive and diskette drive ribbon cables. (The hard disk drive cable is slightly wider than the diskette drive cable.) Look at the back of each drive to make sure you know which cable is which.

Both the diskette drive and hard disk drive sockets are located on the main system board on the left side of the subassembly, as shown below.



Both sockets have a notch on one side. As shown below, there is a tab on one side of the connector. Connect the diskette drive cable first.

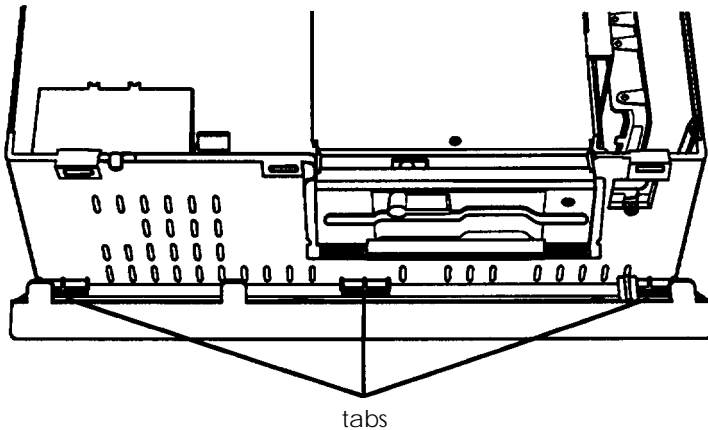


Align the connector with the socket so the tab on the connector lines up with the notch in the socket. Make sure the holes in the connector fit over all the pins in the socket and then push in the connector.

Caution

If you do not correctly align the holes with the pins, you could severely damage your computer when you push in the connector.

7. Now connect the hard disk drive cable in the same manner.
8. To replace the front panel, fit the three ridged tabs on its bottom edge into the three notches on the lower edge of the computer, as shown below.

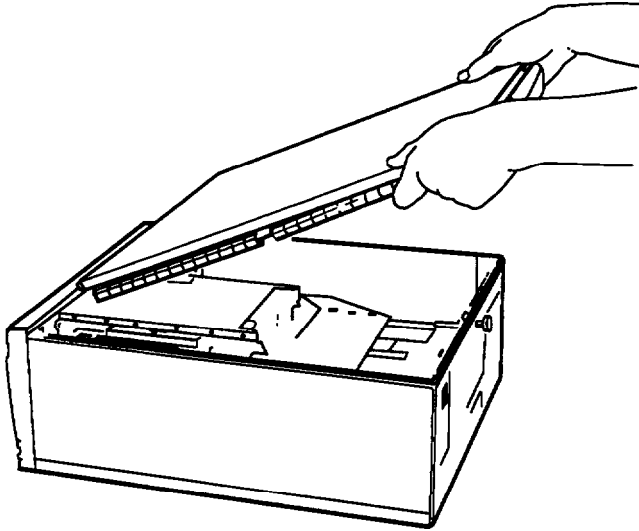


9. Tilt up the front panel until the tabs on the top of the panel touch the computer. Then push on the top of the panel until it snaps into place.

Replacing the Cover

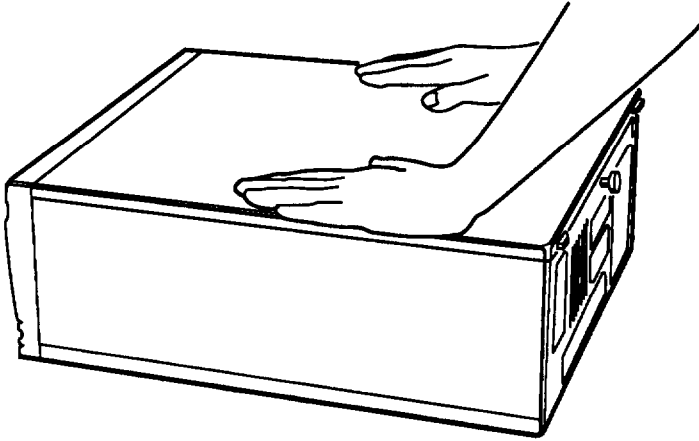
Follow these steps to replace the computer's cover:

1. Facing the back of the computer, hold the cover so that the side with three tabs on the edge faces away from you, as shown below.



2. Insert the three tabs into the three notches behind the front panel of the computer.

3. Lower the cover onto the computer and press it down firmly to form a tight seal.



4. Turn the large screw on the back panel clockwise to secure the cover to the computer.
5. Reconnect the computer to the monitor, printer, keyboard, and any other peripheral devices you have. Then reconnect the power cable to the back of the computer and to an electrical outlet.

Chapter 4

Installing and Removing Options

You can enhance the performance of your computer by adding a variety of options, including the following:

- ❑ Option cards
- ❑ Memory modules
- ❑ A math coprocessor.

An option card is a circuit board you install in your computer to add a particular function. Most option cards contain a device, such as a modem, or provide an interface, such as a high-resolution graphics card for a VGA monitor or a network connector. This chapter describes how to install option cards and configure your computer for use with them.

Memory module-also called SIMMs (single inline memory modules)-allow you to increase the amount of memory in your computer. If you want to install SIMMs, you may prefer to ask your dealer to do it for you. You can, however, follow the instructions in this chapter to install them yourself. This chapter describes the SIMMs you can use in your computer.

Note

It is best not to expand your system's memory by installing an optional memory card. Using memory modules is more efficient since you do not need to use one of your option slots to add memory. Your computer can also access memory installed on memory modules faster than memory installed on a card.

A math coprocessor speeds up the numeric calculations your computer performs when using certain application software. If you purchase a math coprocessor, it is a good idea to ask your dealer to install it for you, because it can be damaged easily. If you decide to install it yourself, follow the appropriate steps in this chapter.

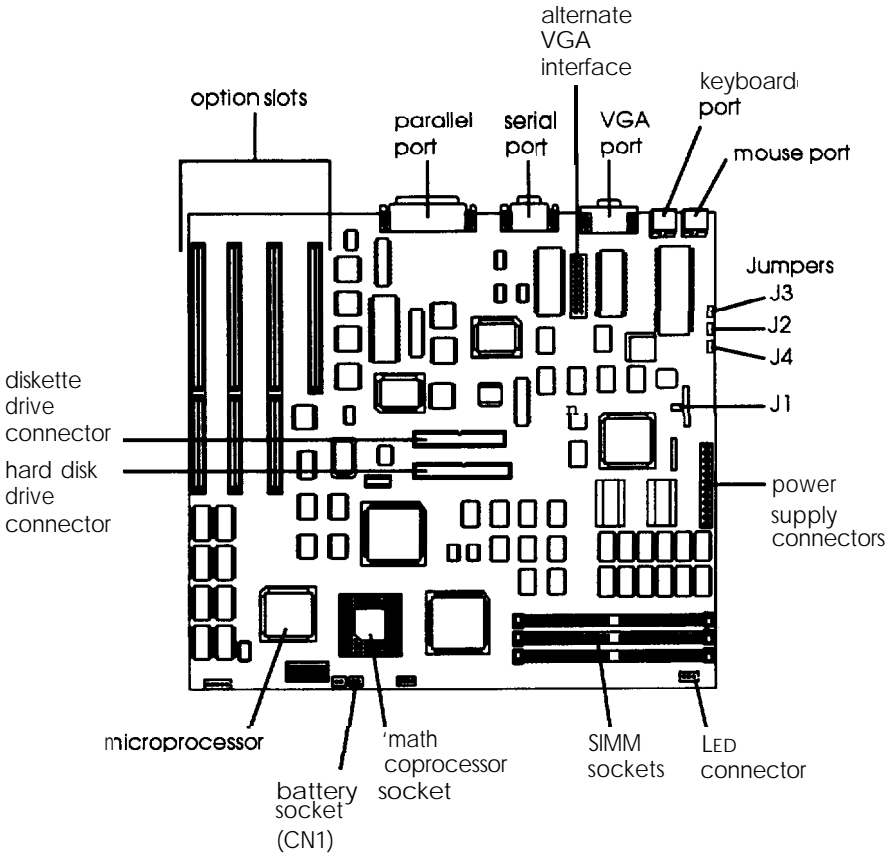
This chapter also explains how to change the jumper settings inside the computer. You may need to change jumper settings if you install certain types of options or if you want to change the way your computer operates.

If you need to replace the battery for your computer's real-time clock and CMOS RAM, you can follow the instructions in this chapter.

To change jumper settings, replace the battery, or install the options mentioned above, you must remove the computer's cover and you may need to remove the subassembly. See Chapter 3 for instructions. (You do not need to remove the subassembly to install or remove option cards.)

Main System Board

As you follow the instructions in this chapter and Chapter 5, use the illustration below to locate the necessary components on your main system board.



Changing the Jumper Settings

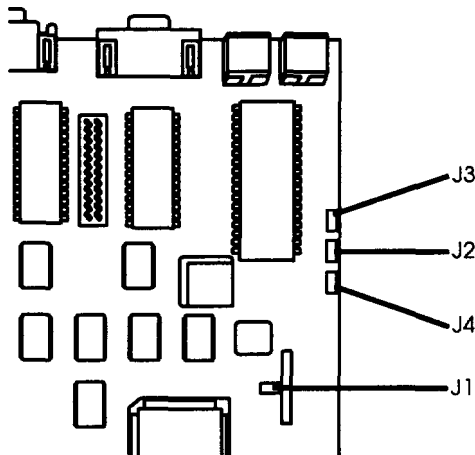
A jumper is a small electrical connector that controls one of the computer's functions. The jumper settings in your computer are preset at the factory; however, you can alter the following functions by changing the standard settings:

- ❑ Enable or disable the built-in VGA display adapter
- ❑ Enable or disable the built-in mouse connector
- ❑ Enable or disable the password function
- ❑ Set the computer to use a color or monochrome monitor.

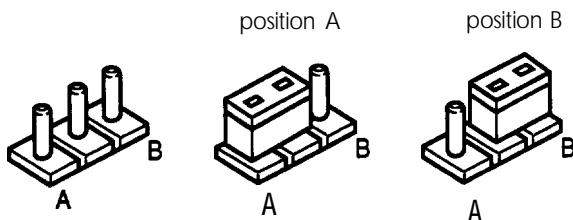
If you need to change any jumper settings, follow the instructions in this section.

Setting the Jumpers

The illustration below shows the locations of the jumpers on your computer's main system board.



A jumper's setting is determined by where the jumper is placed on the pins. It connects either pin A and the middle pin (position A) or pin B and the middle pin (position B), as shown below.



To move a jumper from one position to the other, use needle-nose pliers or tweezers to pull it off its pins and gently move it to the desired position.

Caution

Be careful not to bend the jumper pins or damage any surrounding components on the main system board.

The following table lists the jumper settings and their functions.

Main system board jumper settings

Jumper number	Jumper setting	Function
J1	A'	Enables the built-in VGA display adapter
	B	Disables the built-in VGA display adapter so you can use a display adapter on an option card in your computer as your primary adapter
J2	A'	Enables the built-in mouse connector
	B	Disables the built-in mouse connector so you can use a mouse or other pointing device connected to a port on an option card in your computer
J3	A	Disables the password function
	B*	Enables the password function
J4	A*	A color monitor is installed
	B	A monochrome monitor is installed

. Factory setting

If you need to change any jumper settings, follow these steps:

1. Remove the computer's cover as described in Chapter 3.
2. Remove any option cards that may be blocking your access to the jumpers. See page 4-15 for instructions.
3. Change the jumper settings.
4. Replace any option cards you removed. See "Installing an Option Card" on page 4-11.
5. Follow the instructions in Chapter 3 to replace the computer's cover.

Replacing the Battery

Your computer comes with a 3.6 volt lithium battery that provides power for the real-time clock and the CMOS RAM. The real-time clock keeps track of the time for your computer, and the CMOS RAM stores the information about your system configuration that was saved by the SETUP program.

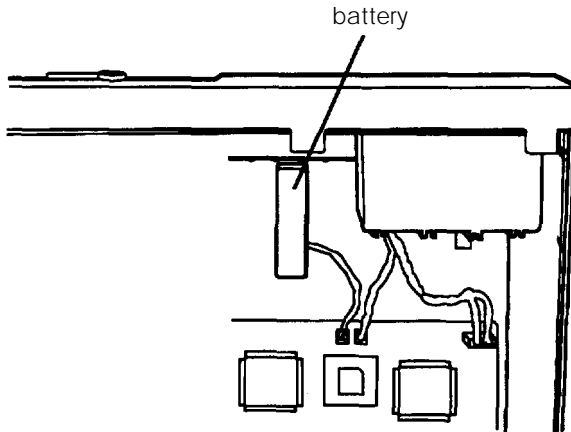
This battery lasts approximately three to five years. If it loses power, you will see an error message when you turn on or reset your computer. **Contact** your dealer to obtain a replacement battery or to install the new battery for you. If you want to replace the battery yourself, you can follow the instructions in this section.

Note

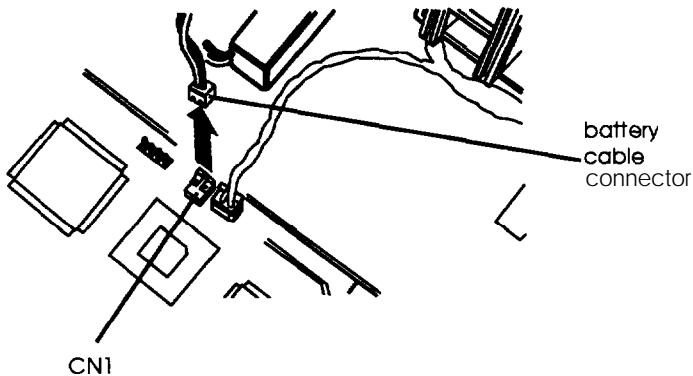
When the battery runs out, your computer loses the information stored in the CMOS RAM and the time stored in the real-time clock. After you replace the battery, run the SETUP program as described in the *Setup Guide* to reconfigure your system and set the real-time clock.

Follow these steps to replace the battery:

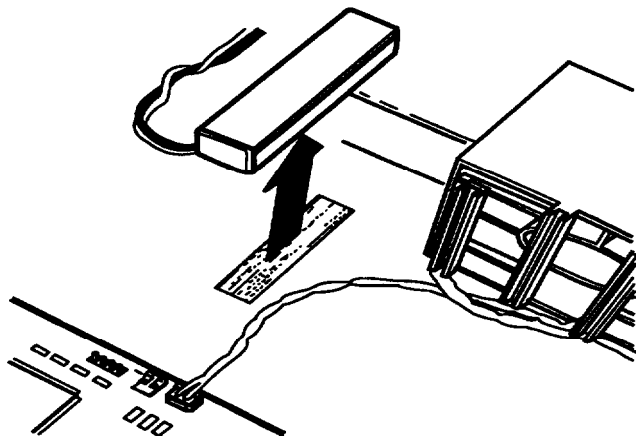
1. Remove the computer's cover as described in Chapter 3.
2. The battery is attached to the bottom of the computer case, just behind the front panel, as shown below.



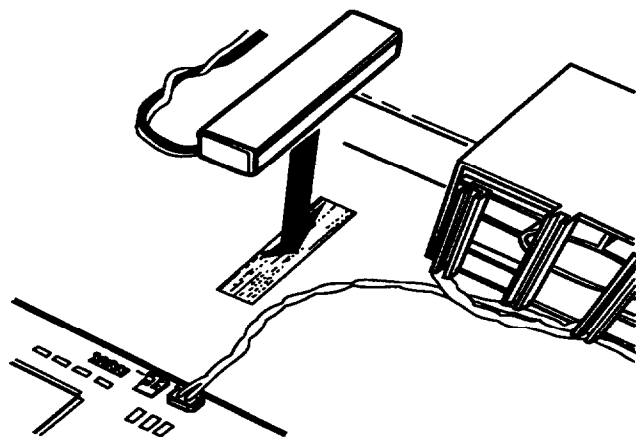
To disconnect the battery from the main system board, pull up the connector plugged into socket CN1, as shown below.



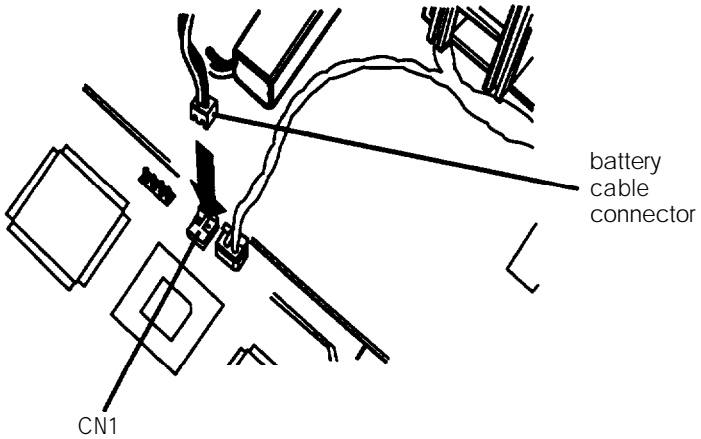
3. The battery is attached to the computer with Velcro.[®] Remove the battery by pulling it up from the bottom of the computer case, as shown below. Then set it aside.



4. Remove the new battery from its package and position it so the Velcro faces down and the cable faces connector CN1. Then attach it to the bottom of the computer case, as shown below.



5. Connect the battery cable to connector CN1.



6. Follow the steps in Chapter 3 to replace the computer's cover. Then run the SETUP program to reconfigure your system and reset the time for the real-time clock. See Chapter 2 of the Setup Guide for instructions.

Installing an Option Card

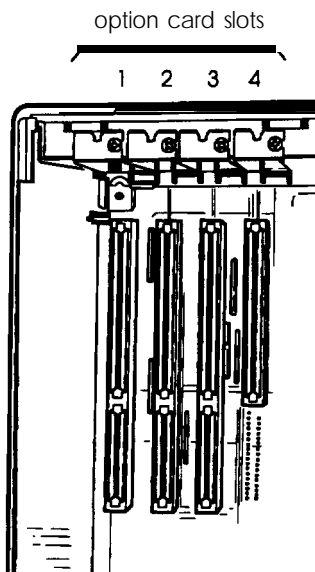
Your computer has four standard option slots: three 16-bit slots and one 8-bit slot. Each slot can accommodate an option card. You can buy option cards from authorized Epson dealers as well as other vendors.

This section explains how to install option cards in your computer. If you need to remove an option card later (to access jumpers, memory modules, or a math coprocessor), see “Removing an Option Card” on page 4-15 for instructions.

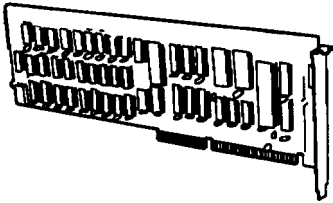
Note

After you install or remove an option card, see “Post-installation Setup” at the end of this chapter for information about reconfiguring your computer.

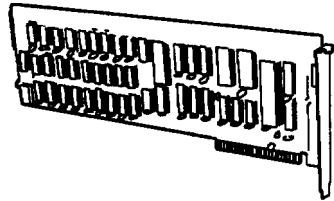
The illustration below shows the four standard option slots inside your computer.



Slots 1 through 3 are designed for 16-bit option cards and slot 4 is designed for an 8-bit card. As you can see below, a 16-bit card has an extra connector along the bottom.



M-bit card



8-bit card

Usually it does not matter which slot an option card occupies as long as the card fits in the slot. For example, you can place some B-bit cards in a 16-bit slot. However, you must follow these guidelines when deciding which slot to use:

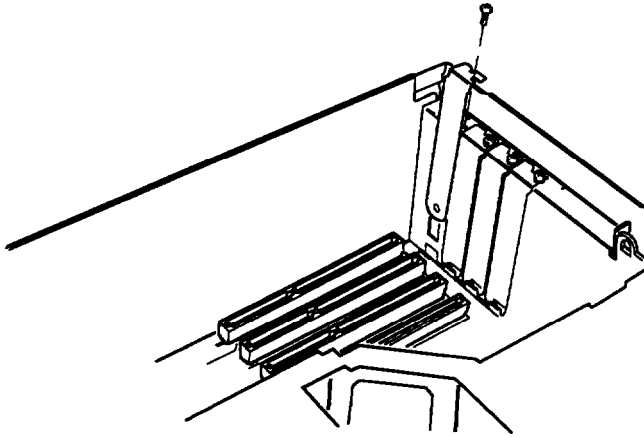
- ❑ An 8-bit card with an additional tab along the bottom must go into an S-bit slot.
- ❑ If you install a disk drive controller card, place the card as close as possible to the drive it is controlling.
- ❑ Some option cards must be installed in a specific slot. Consult the instructions that come with the card to see if this is the case.

Note

If you are installing a high-resolution graphics adapter card, follow the instructions below to install the adapter card; then see “Using the Alternate VGA Interface” on page 4-16 to connect the card to the alternate VGA interface in your computer.

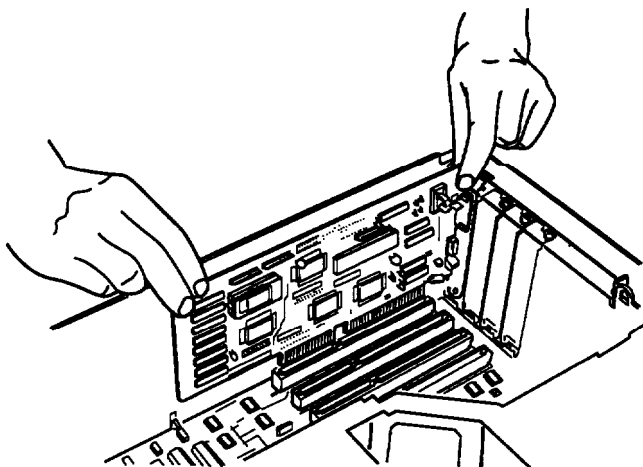
Follow these steps to install an option card:

1. Remove the computer's cover as described in Chapter 3.
2. If you are installing an option card that controls a mouse, you need to change the setting of jumper J2 on the main system board before you install the card. If you install a display adapter card, you may need to change the settings of jumpers J1 and J4. See page 4-4 for instructions.
3. Remove the retaining screw from the top of the metal option slot cover; hold on to the screw so it doesn't fall into the computer. Lift out the slot cover.



Keep the screw to secure the option card to the computer. Store the slot cover in a safe place in case you remove the option card later.

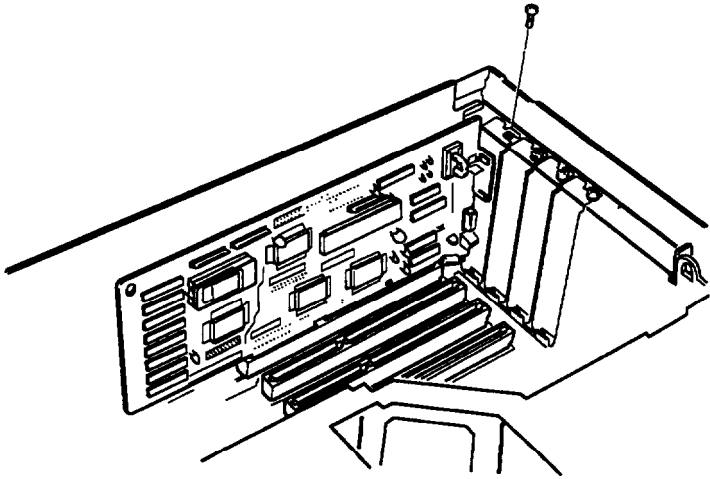
4. Unpack the option card and adjust any switches or jumpers on it, if necessary. (Check the option card instructions.) When you handle the card, be careful not to touch any of the components on the circuit board or the gold-edged connectors. If you need to set it down before you install it, place it gently on top of its original packing material with the component side facing up. Keep the packing materials in case you remove the card later.
5. Grip the card firmly by the top corners and make sure the connectors point down, as shown below.



6. Insert the card into the slot, guiding it straight down. Once the connectors reach the slot, push the card downward firmly (but carefully) to insert it fully. You should feel the card fit into place.

If the card does not go in smoothly, do not force it; pull it all the way out and try again, keeping it straight as you insert it. Examine the card to verify that it is fully seated in the slot along the length of the connector.

7. Secure the end of the card to the back of the computer with the retaining screw.



8. Follow the instructions in Chapter 3 to replace the cover. Then see “Post-installation Setup” at the end of this chapter.

If you installed a high-resolution graphics adapter card, see “Using the Alternate VGA Connector,” below, for instructions.

Removing an Option Card

If you need to remove an option card, follow these steps:

1. Remove the computer’s cover as described in Chapter 3.
2. Remove the screw securing the card to the back of the computer and pull it straight up and out of the slot.
3. Cover the option slot opening with the original metal cover and secure it with the retaining screw.

4. If you are removing an option card that controls a mouse, you need to change the setting of jumper J2 on the main system board. If you are removing a display adapter card, you may need to change the settings of jumpers J1 and J4. See page 4-4 for instructions.
5. Replace the cover. See Chapter 3 for instructions. Then see “Post-installation Setup” at the end of this chapter.

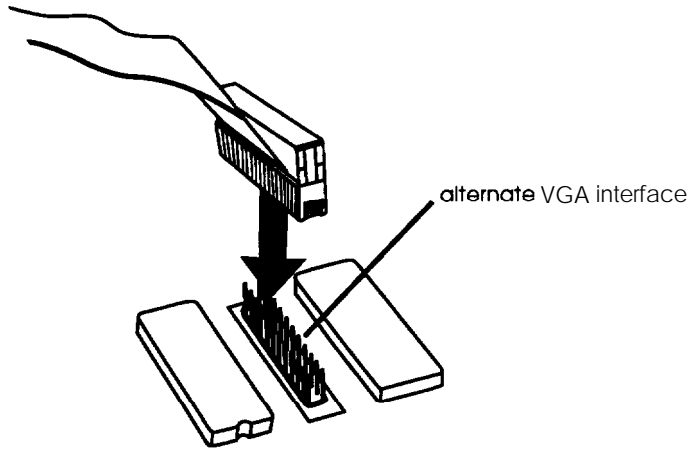
Using the Alternate VGA Interface

Your computer includes an alternate VGA interface on the main system board. This feature allows you to install a high-resolution graphics adapter card in one of the option slots for your VGA monitor and still access the standard VGA signals provided by your main system board circuitry.

To connect the graphics adapter card interface to the alternate VGA interface, follow these steps:

1. Remove the computer's cover as described in Chapter 3.
2. Set jumper J1 on the main system board to B to disable the built-in VGA display adapter. See “Changing the Jumper Settings” on page 4-4 if you need instructions.
3. If you have not already done so, follow the instructions above to install the graphics adapter card in your computer.

4. Locate the VGA feature cable that came with your system. (See the main system board map on page 4-3.) Attach one end of the cable to the alternate VGA interface on the main system board, as shown below.



5. Connect the other end of the cable to the appropriate interface on the adapter card. (Check your graphics card manual for instructions.)
6. Follow the instructions in Chapter 3 to replace the computer's cover. Then see "Post-installation Setup" at the end of this chapter.

Adding Memory Modules

Your computer comes with 4MB of memory soldered directly onto the main system board. By installing 4MB SIMMs (single inline memory modules), you can increase the memory in your computer up to 16MB.

Caution

It is best to have your dealer install memory modules for you because they can be damaged easily if installed incorrectly. If you prefer, you can install them yourself by carefully following the instructions in this section. However, you could transmit an electrostatic discharge and damage your components; so read this entire section before you begin.

Before you install SIMMs, check the following guidelines to ensure that they will work properly:

- ❑ Use only 4MB fast page mode SIMMs that operate at an access speed of 80ns (nanoseconds) or faster. Be sure all the SIMMs operate at the same speed.
- ❑ The Equity 386/33 PLUS can use any 4MB SIMM that complies with industry standards; however, you should use Epson SIMM option kits to ensure reliability and compatibility.

Installing Memory Modules

There are three SIMM sockets on the main system board. You can install one 4MB SIMM in each of these sockets. The following table shows all the possible SIMM configurations for your computer. Do not install SIMMs in any configuration that is not listed below. Keep in mind that 4MB of memory is already soldered directly on the main system board.

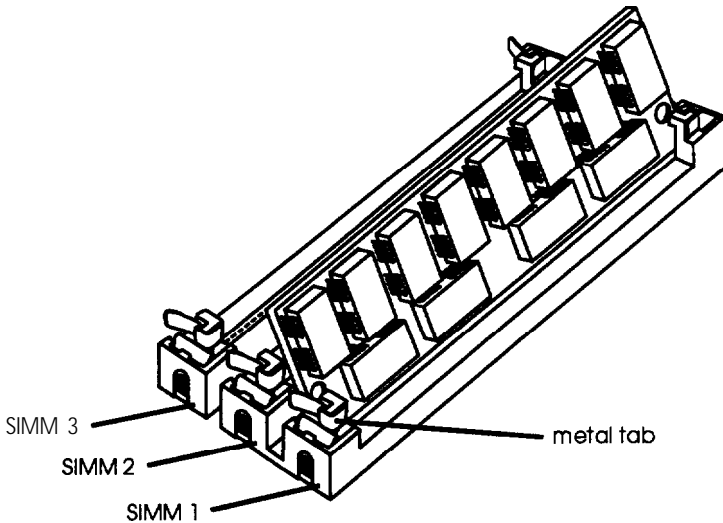
SIMM configurations for the Equity 386/33 PLUS

SIMM 1	SIMM 2	SIMM 3	Total memory*
4MB			8MB
4MB	4MB		12MB
4MB	4MB	4MB	16MB

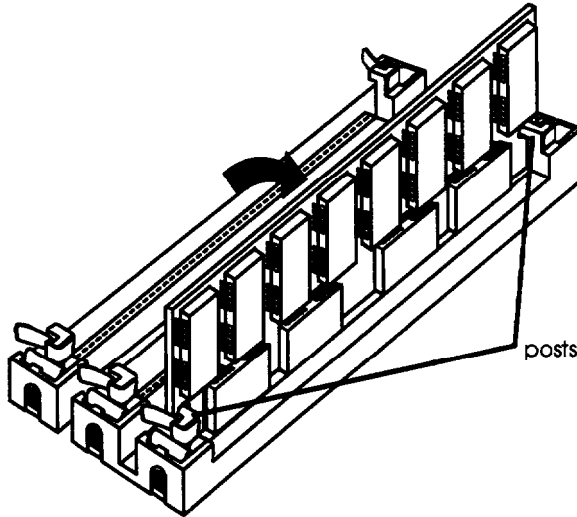
- Includes 4MB soldered on main system board

Follow these steps to install SIMMs:

1. Remove the computer's cover and subassembly as described in Chapter 3.
2. The SIMM sockets are located on the front of the main system board near the math coprocessor socket, as shown on page 4-3.
3. Install the first SIMM in the socket marked SIMM 1. Position it so the components on the SIMM face the other components on the main board. Place it on the left side of the metal tabs at an angle, as shown below.



4. To insert the SIMM into the socket, press it down firmly into the slot. At the same time, raise the SIMM to stand upright, as shown below.



The SIMM should snap into place between the metal tabs, and the posts should extend through the holes at both ends. If it does not go in smoothly, do not force it; pull it all the way out and try again.

5. Repeat steps 3 and 4 for each SIMM you want to install.
6. Replace the subassembly and cover as described in Chapter 3.
7. Then see “Post-installation Setup” at the end of this chapter for instructions on configuring your computer for use with your new memory.

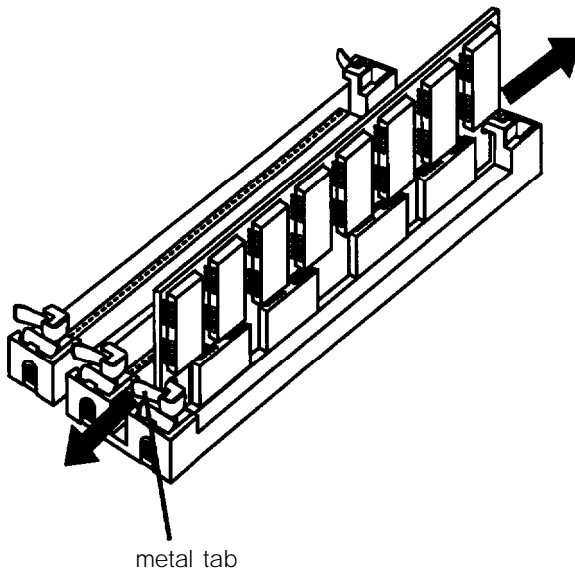
Removing Memory Modules

If you need to remove memory modules from your computer, have your dealer do it for you or follow the steps below. If you remove them yourself, check the table on page 4-19 to be sure you remove SIMMs from the correct sockets.

Caution

It is safer to have your dealer remove SIMMs for you since there is a danger of transmitting an electrostatic discharge and damaging your components.

1. Remove the computer's cover and subassembly as described in Chapter 3.
2. Use your fingers or two small screwdrivers to pull away the metal tabs that secure the SIMM at each end. Be careful not to pull the tabs too far, or they may break.



As you pull away the tabs, the SIMM falls to the side. When the SIMM is at an angle, carefully remove it from the socket.

3. Repeat step 2 for each SIMM you need to remove.
4. Replace the subassembly and cover as described in Chapter 3.
5. Then see “Post-installation Setup” at the end of this chapter for instructions on configuring your computer for use with your decreased memory.

Installing a Math Coprocessor

Your computer has a socket on the main system board to accommodate an 80387DX, 33 MHz or 3167,33 MHz math coprocessor. A math coprocessor speeds up your computer's numeric calculations and graphic image displays when you are using certain application software.

It is best to have your dealer install a math coprocessor for you, since it is a delicate component that can be damaged easily if it is installed incorrectly.

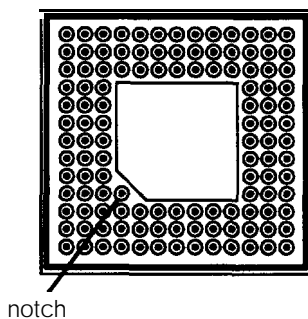
If you install it yourself, be sure to read the manual that came with your math coprocessor, if you received one. Then follow the steps in this section to install it in your computer. Before you begin, be sure to read all of the instructions and warnings carefully so you do not injure yourself or damage the coprocessor or your computer.

Caution

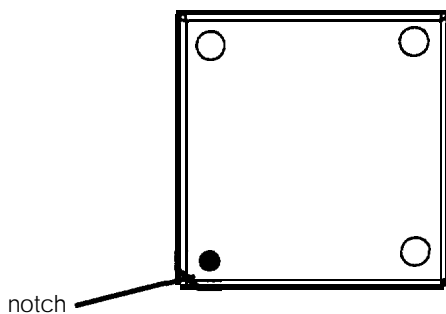
To avoid generating static electricity and damaging your math coprocessor, remain as still as possible when you install it.

Carefully follow these steps to install a math coprocessor:

1. Remove the computer's cover and subassembly as described in Chapter 3.
2. Remove the math coprocessor from its package and set it aside.
3. The math coprocessor socket on the main system board is square and has three rows of pins on each side. It has a notch in the lower left corner, as shown below.



The math coprocessor also has a notch in one corner, marked by a dot, as shown below.

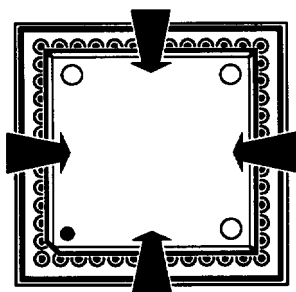


Align the notched corner of the coprocessor with the notched corner of its socket. The notched sides must be aligned for the coprocessor to operate properly, so be sure its position is correct before you go to the next step.

Caution

If you insert the math coprocessor in the wrong position, you could permanently damage it and destroy the components on the main system board.

4. Gently push the coprocessor into the socket, pressing evenly on all sides, as shown below.



If the coprocessor does not go in smoothly, do not force it; pull it all the way out and try again, keeping it straight as you insert it.

It is completely inserted when the surface of the coprocessor is flush (even) with the surface of the socket. Be sure it is inserted all the way.

5. Replace the subassembly and cover as described in chapter 3.
6. Then see “Post-installation Setup” at the end of this chapter for instructions on configuring your computer for use with your math coprocessor.

Removing a Math Coprocessor

If you need to remove a math coprocessor from your computer, contact your dealer for assistance. You need a special extracting tool to remove the coprocessor without damaging it. Do not attempt to remove it without this tool; you can easily damage it.

Follow the steps in Chapter 3 to remove the computer's cover and subassembly. Then remove the coprocessor with the tool and replace the subassembly and the cover.

After you remove the coprocessor, run the SETUP program to configure your system for use without it. See Chapter 2 of the *Setup Guide* for instructions.

Post-installation Setup for Memory Curds

After you install an optional memory card, you need to configure your computer to use it. Follow these guidelines:

- ❑ Run the SETUP program to reset your computer's configuration to include the memory on your memory card. See Chapter 2 of the *Setup Guide* for instructions.
- ❑ Use the setup program that comes with your memory card to configure the computer for use with your particular card. See your memory card manual for instructions.
- ❑ If you installed the RampagePlus® 286+ memory card, follow the instructions in "Using the CORFIX Program," below, before you install the RampagePlus software.

Also see "Post-installation Setup," below, for more information on setting up your computer for use with an option card.

Using the CORFIX Program

To configure your computer for use with the RampagePlus 286+ memory card, you need to run CORFIX, a utility program on your Reference diskette; and then run SMART, the RampagePlus 286+ setup program.

Follow these steps to run CORFIX:

1. If you copied the CORFIX.EXE file to your hard disk, log onto **the** directory where it is stored. If you did **not** copy the file, insert the Reference disk in drive A. Then type A : and press to log onto that drive.
2. Type `CORFIX` and press . You see the following message:

```
The program will configure the system to
work with the SMART utility when
installing the RampagePlus 286.
```

```
Smart can only be executed immediately
after this configuration program.
Continue? (Y/N)
```

3. To run the program, press . To exit without running the program, press . If you press , you see **the** operating system prompt and the following message:

```
Configuration completed. The SMART
installation utility may now be used.
```

Now you can run the SMART setup program as described in your RampagePlus 286+ manual.

Post-installation Setup

After you install or remove options such as memory modules, a math coprocessor, or a disk drive, you must run SETUP to update the computer's configuration. For example, if you add a hard disk, you need to let the computer know the type of drive it is. See Chapter 2 of the *Setup Guide* for instructions.

If you replaced the battery for the real-time clock and CMOS RAM, you must run SETUP to reconfigure your system and reset the clock. See Chapter 2 of the *Setup Guide*.

If you install a hard disk drive that has never received a hardware level format (such as some non-Epson hard disk drives), you need to format the disk. Check the manual that came with your drive, and then, if necessary, follow the instructions in Appendix B to format your new hard disk.

If you have added a hard disk **drive** and you **want to** load MS-DOS or another operating system from that drive, you **need** to install the operating system **on** it. See the documentation that came with your operating system for instructions.

If you install **an** optional memory card, use the setup program that comes with it to configure the computer for use with the card. See your memory card manual for instructions.

Additionally, you may need to add some commands to your configuration files. See your operating system manual and the manual that comes with your optional equipment for instructions.

You may also want to test a newly-installed option. Some options come with their own diagnostics test programs, and you can use the diagnostic programs on your Reference diskette to test system memory, serial and parallel ports, disk drives, monitors and display adapters. See Appendix B for instructions.

Chapter 5

Installing and Removing Drives

The instructions in this chapter describe how to install and remove optional Epson drives in your computer. You can use these instructions to install a variety of devices, including diskette drives, hard disk drives, and tape drives. Although your drive may look a bit different from the one illustrated here, you install it the same way.

If you are installing or removing a non-Epson drive, some of the steps in this chapter may not apply; see the documentation that came with your drive for more information.

Before you perform any of the procedures described below, follow the steps in Chapter 3 to remove the computer's cover and subassembly.

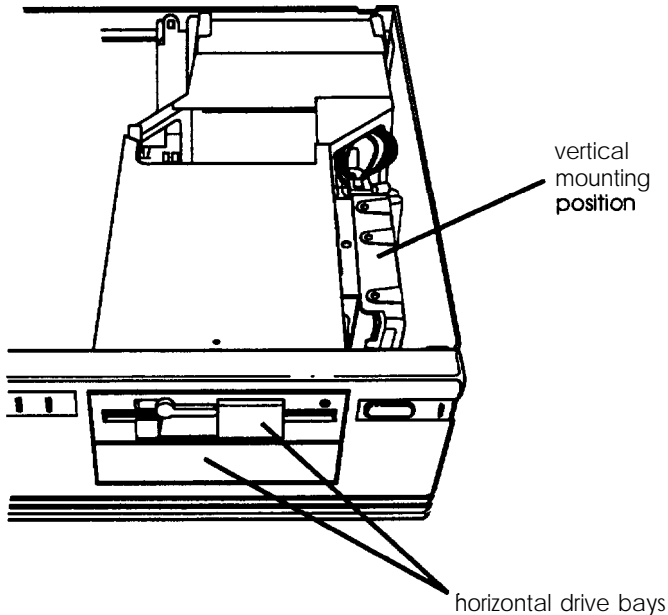
When you complete your drive installation or removal, follow the instructions in Chapter 3 to replace the subassembly and cover. Then see "Post-installation Setup Procedures" at the end of Chapter 4 for information about updating the SETUP program with your new drive configuration.

Caution

Installing or removing a disk drive is a complicated procedure, so you may want to ask your dealer to do it for you. If you decide to do it yourself, follow all the instructions in this chapter carefully, or you could damage your system.

Choosing the Correct Drive Bay

Your computer has two horizontal drive bays and one vertical mounting position which hold up to three drives, as shown below.



Your computer may have come with a hard disk drive already installed in the vertical mounting position. If not, you can install one 3½-inch hard disk drive in this position.

If you are installing your first hard disk drive, it is best to install it in the vertical mounting position. If you add a second hard disk drive or diskette drive, use the lower horizontal drive bay.

The upper horizontal drive bay probably contains the diskette drive that came with your system. This drive bay can accommodate one of the following types of devices:

- ❑ 5¼-inch diskette drive
- ❑ **3½-inch** diskette drive with 5¼-inch mounting frames installed on it.

You can install an additional device of one of the following types in the lower horizontal drive bay:

- ❑ 5¼-inch diskette drive, tape drive, CD-ROM, or other storage device
- ❑ **3½-inch** diskette drive, hard disk drive, tape drive, or other storage device with 5¼-inch mounting frames installed on it.

How to Use This Chapter

Before you begin, see the table below for a guide to the instructions you should follow first in this chapter.

Drive installation or removal instruction guide

If you are . . .	Begin with this section . . .
Installing a hard disk drive or removing one and leaving another in the computer	'Setting the Hard Disk Drive Jumpers' on 5-4
Removing your only hard disk drive	'Removing a Hard Disk From the Vertical Position' on page 5-17
Installing or removing a diskette drive or other device	'Installing or Removing a Drive in the Horizontal Position' on page 5-19

Information in each of these sections guides you to the instructions you should follow next.

Setting the Hard Disk Drive Jumpers

You may need to change the hard disk drive jumper settings if you install or remove a hard disk drive. The jumpers tell the computer whether you are using one hard disk drive or two.

Note

You do not need to set these jumpers if you are removing your only hard disk drive.

If you are installing just one hard disk drive, see “Changing the Jumper Settings,” below, to check the jumpers on your drive.

If you are removing one hard disk drive and leaving another in your computer, you need to change the jumper settings on the remaining drive to indicate that it will be the only hard disk drive installed.

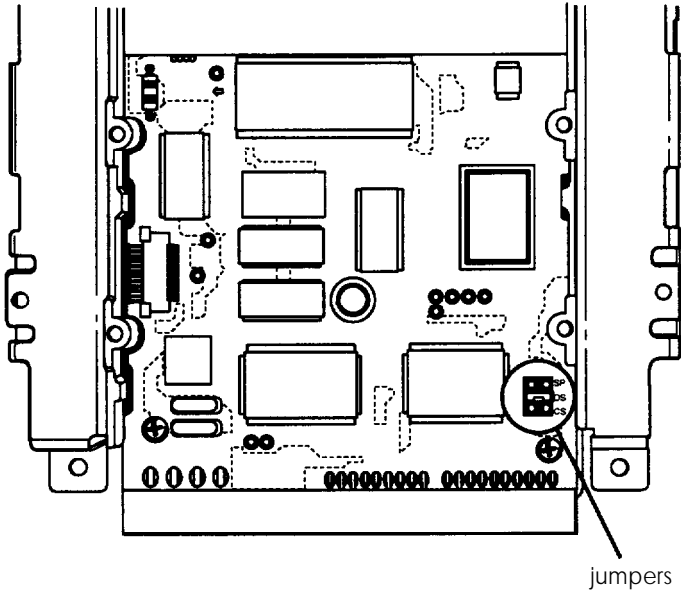
If you install two hard disk drives in your system, you must change the jumper settings on each drive to indicate which drive is the master (primary) drive and which is the slave (secondary) drive.

A master drive is the drive on which you'll install the operating system that the computer loads into its memory each time you turn it on. You can run application programs and store data on both the master drive and the slave drive, but the operating system must be contained on the master drive.

Follow the instructions below to change the jumper settings on your hard disk drives.

Changing the Jumper Settings

The hard disk drive jumpers are usually located on the drive's circuit board, near the large cable connector.



The instructions in this section describe setting the jumpers on the standard Epson 120MB hard disk drive. The jumpers on your drive may be in a slightly different location, but you set them the same way. See the documentation that came with your hard disk drive for the proper settings.

There are three positions for the jumpers on the Epson 120MB hard disk drive.

The following table lists the jumper settings for all the possible 120MB hard disk drive configurations.

Hard disk drive jumper settings

Jumper positions	One hard disk drive	Two hard disk drives: master	Two hard disk drives: slave
SP	—	X	-
DS	X	X	-
CS	-	-	-

X = jumper Installed

- = no jumper Installed

To move a jumper from one position to the other, use your fingers, needle-nose pliers, or tweezers to pull it off its pins and gently move it to the other position. Be careful not to drop the jumper or damage the pins as you install it.

If you are going to use only one hard disk drive, make sure the jumper is set in position DS. Then see “Installing a Hard Disk in the Vertical Position” on the next page for instructions on installing your first hard disk drive.

If you’ll be using two hard disk drives, install two jumpers on the master drive in positions SP and DS. Do not install any jumpers on the slave drive.

If you are installing both of your hard disk drives at one time, it is easiest to install the drive in the horizontal drive bay first. See “Installing or Removing a Drive in the Horizontal Position” on page 5-19 for instructions.

If one of your hard disk drives is already installed in the computer, follow the steps under “Removing a Hard Disk From the Vertical Position” on page 5-17 to remove it. Then set the jumpers on both drives while they are out of the computer.

Note

If you are removing one hard disk drive and leaving one in your computer, be sure to set the jumpers on the remaining drive to indicate that you have only one hard disk drive. See the table above for the jumper settings. Then follow the instructions under “Removing a Hard Disk From the Vertical Position” on page 5-17 so you can access the jumpers on the drive.

Installing a Hard Disk in the Vertical Position

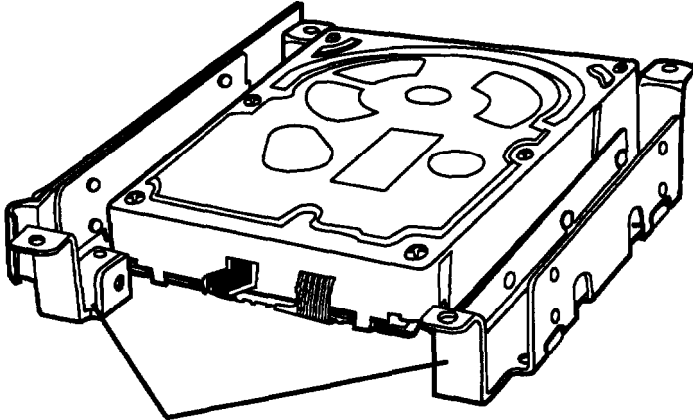
Follow the instructions in this section to install (or reinstall) a hard disk drive in the vertical mounting position. You may need to perform the following procedures:

- Remove the mounting frames from a new hard disk drive
- Remove the mounting plate from the computer and connect it to the drive
- Install the drive
- Connect the drive and power cables.

If you are installing a new drive in the vertical mounting position, you should follow all the steps in this section. If you are reinstalling a drive that you previously removed from this position, skip to “Installing the Drive” on page 5-11.

Removing the Mounting Frames from the Drive

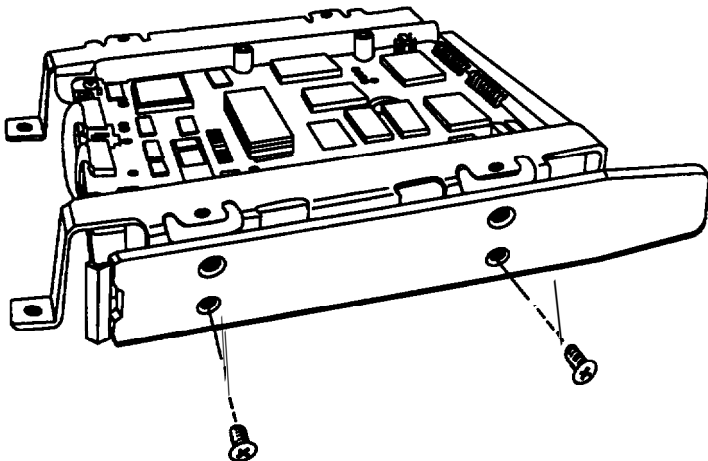
Your hard disk drive comes with 5/8-inch mounting frames attached to each side of the hard disk drive, as shown below.



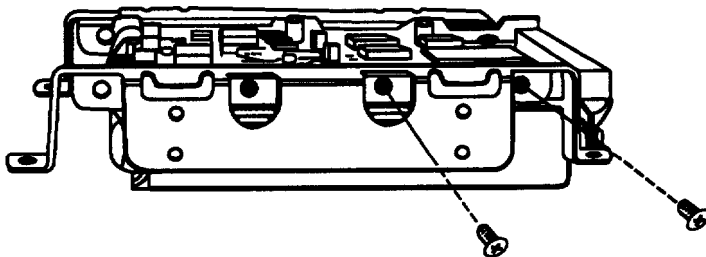
mounting frames

On one side, there may also be a plastic guiderail. Follow these steps to remove the mounting frames (and guiderail) from the drive:

1. If necessary, remove the screws securing the plastic guiderail and the metal grounding plate to one of the mounting frames, as shown below.



2. Remove the four screws securing the mounting frames to the hard disk drive. There are two screws securing each frame, as shown below.

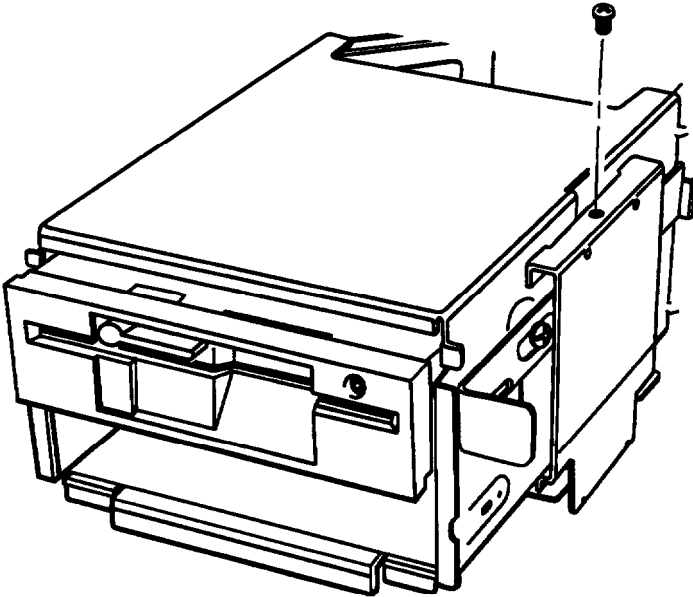


Removing and Attaching the Mounting Plate

If you are installing the first hard disk drive in your computer, you need to attach a hard disk drive mounting plate to the drive. This mounting plate is currently attached to the right side of the subassembly.

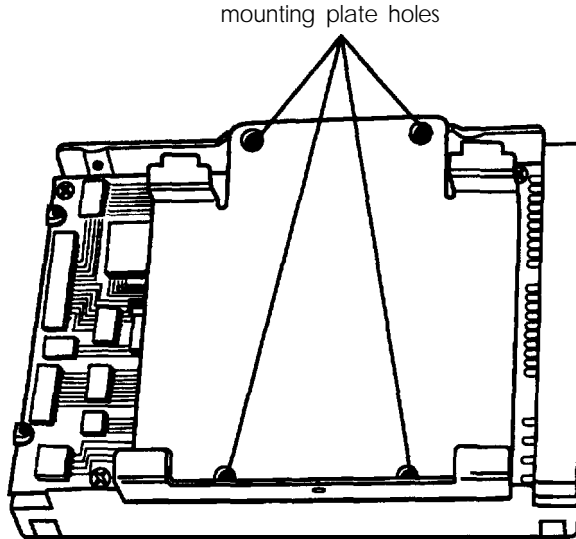
Follow these steps to remove the mounting plate from your computer:

1. Remove the screw securing the mounting plate to the computer and set it aside. Then lift up the mounting plate to remove it.



2. Turn your hard disk drive so the components are facing up and the connectors at the back of the drive are facing to the right.

Then place the flat side of the mounting plate on the hard disk drive and align the four holes on the plate with the four holes on the drive, as shown below.



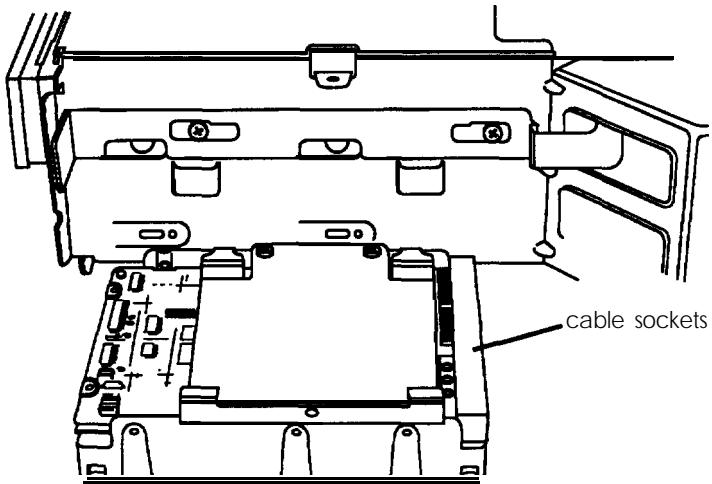
3. Use the four screws that came in your hard disk drive kit to secure the mounting plate to the drive.

Installing the Drive

If you are going to install or remove a drive in one of the horizontal drive bays, first follow the instructions under “Installing or Removing a Drive in the Horizontal Position” on page 5-19. Do not install the vertically mounted drive until you finish installing or removing any horizontal drives.

Follow these steps to install the hard disk drive in the vertical mounting position:

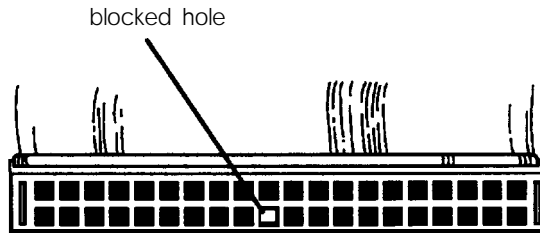
1. Place the hard disk drive on the right side of the subassembly with the mounting plate facing up and the ribbon cable and power supply sockets facing the back of the subassembly.



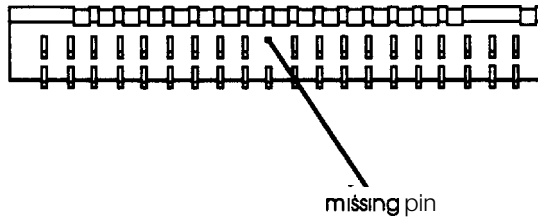
2. Locate the hard disk drive ribbon cable that came with your computer. It is a flat cable with three connectors, one on each end and one in the middle. (If you are installing a second hard disk drive, the cable may be attached to the other drive.)



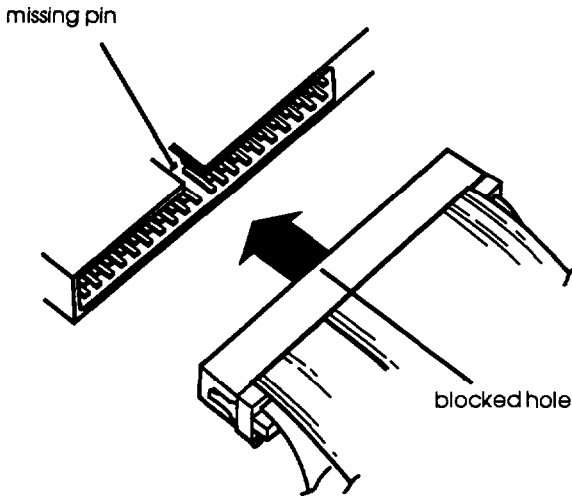
The connector at one end of the cable has two rows of holes, one of which is blocked with a plug, as shown below.



The ribbon cable socket on the back of the drive has two rows of pins. In one of the rows, a pin is missing.



3. Align the connector with the socket so that the row in the connector with the blocked hole lines up with the row in the socket with the missing pin, as shown below.



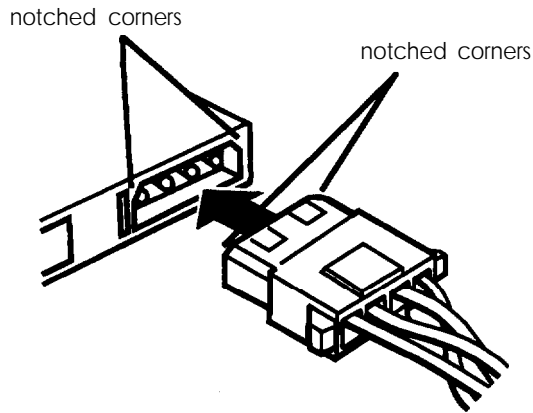
Make sure the holes fit over all the pins and then push in the Connector.

Caution

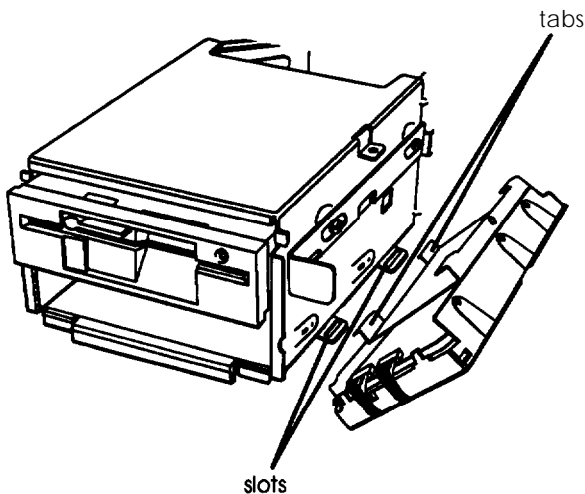
If you do not correctly align the holes with the pins, you could severely damage your hard disk drive when you push in the connector.

4. Locate one of the power supply cables that lead *from* the power supply (behind the horizontal drive bays). The cables are labelled P1, P2, and P3; you can use any one.

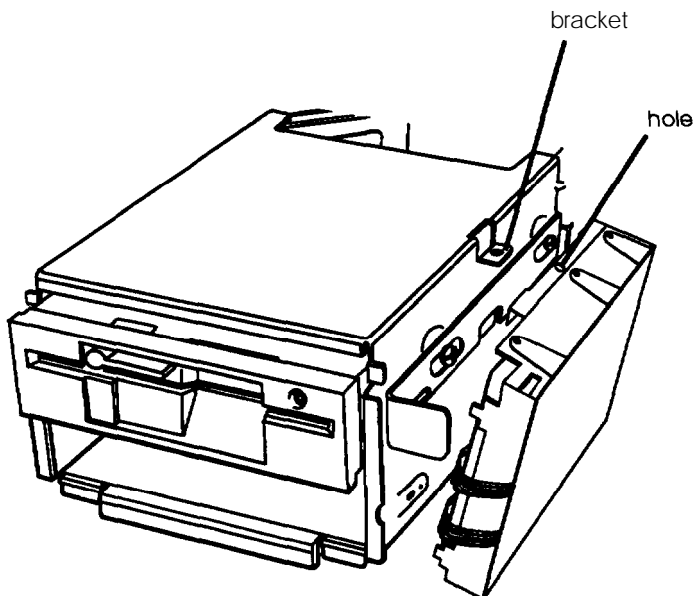
- The power supply socket is on the back of the hard disk drive, next to the cable you just connected. Pull the power supply cable through the lower opening in the right side of the subassembly so it reaches the drive socket easily. Align the connector with the socket so that the notched corners line up, as shown below.



- Notice that there are two tabs facing downward on one edge of the mounting plate. These tabs will fit into two slots in the right side of the subassembly.



Guide the tabs into the slots and tilt the top of the drive toward the subassembly. Then align the retaining screw hole on the mounting plate with the hole in the subassembly bracket.



7. Secure the drive to the bracket with the retaining screw.

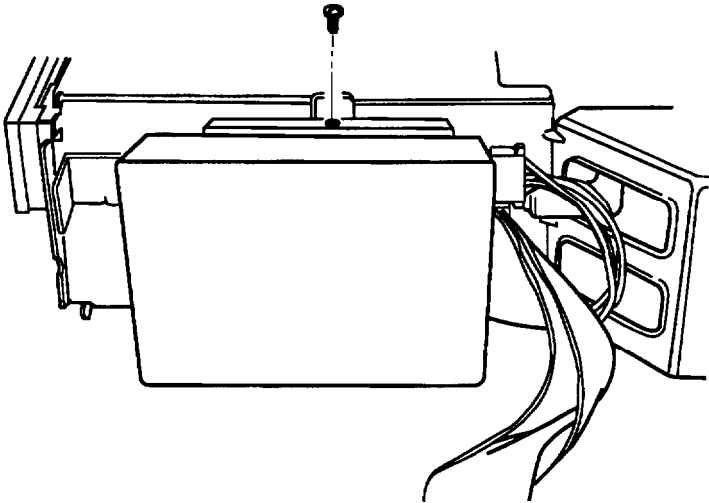
Removing a Hard Disk From the Vertical Position

You need to remove the hard disk drive from the vertical position in the following cases:

- ❑ You are replacing the drive
- ❑ You are adding a second drive (either another hard disk drive or a diskette drive) in the lower horizontal position.

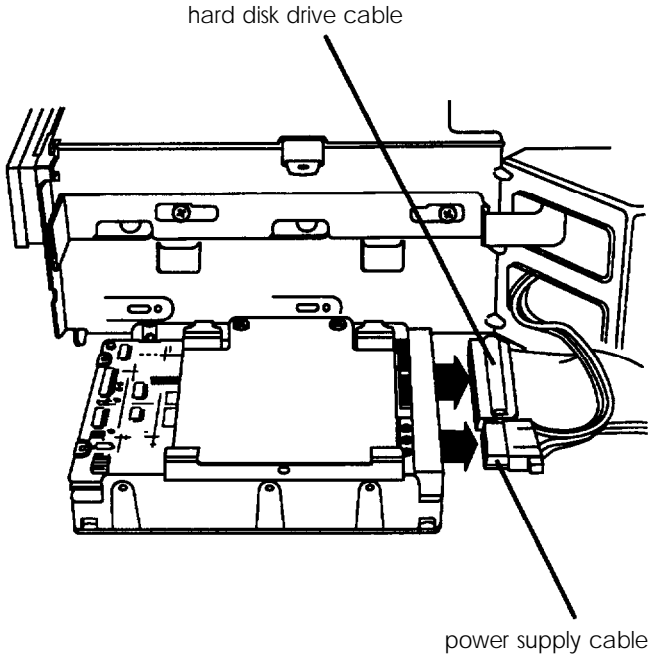
Follow these steps:

1. Remove the retaining screw securing the hard disk drive mounting plate to the subassembly and set it aside.



2. Tilt the hard disk drive slightly to the right and lift it off the subassembly.

3. Disconnect the power supply connector and the ribbon cable connector from the sockets on the back of the hard disk drive, as shown below. Firmly pull the connectors straight out from the sockets so you do not bend the pins. Do not pull on the cables; pull on the plastic connector.



4. If you are going to reinstall the drive, set it aside and see “Installing or Removing a Drive in the Horizontal Position” below. If you are not going to reinstall the drive, go to step 5.
5. Remove the four screws securing the hard disk drive mounting plate to the hard disk drive. Then remove and store the mounting plate along with the screws.
6. Wrap the hard disk drive in its original packing materials.

Installing or Removing a Drive in the Horizontal Position

This section describes how to install or remove a drive in a horizontal drive bay. Although the illustrations show a diskette drive in the lower bay, you can use these same instructions if you need to install a different drive in the upper drive bay.

If you have a hard disk drive installed in the vertical mounting position, remove it before you remove or install a drive in the horizontal drive bay. See “Removing a Hard Disk From the Vertical Position” above.

Installing a Drive in the Horizontal Position

Before you perform the following steps, be sure that you have set the jumpers on any hard disk drive(s) you'll be using. (If not, see “Setting the Hard Disk Drive Jumpers” on page 5-4 for instructions.)

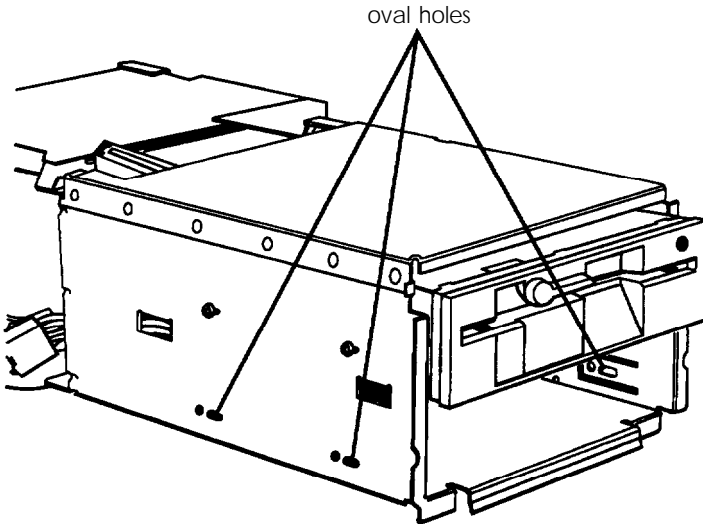
If you are adding a **3½-inch** drive, make sure that 5¼-inch metal mounting frames are attached to the drive so it fits properly in the drive bay. Epson **3½-inch** drives come with mounting frames already installed. If your drive did not come with frames installed, follow the instructions in the manual that came with the drive to attach them.

Follow these steps to install a disk drive:

1. If you are installing a 5¼-inch diskette drive, turn it so that the diskette release latch is above the diskette slot. If you are installing a **3½-inch** diskette drive, turn it so that the diskette release button is on the right and the drive light is on the left.

If you are installing a hard disk drive, turn it so that the side with the components is facing down.

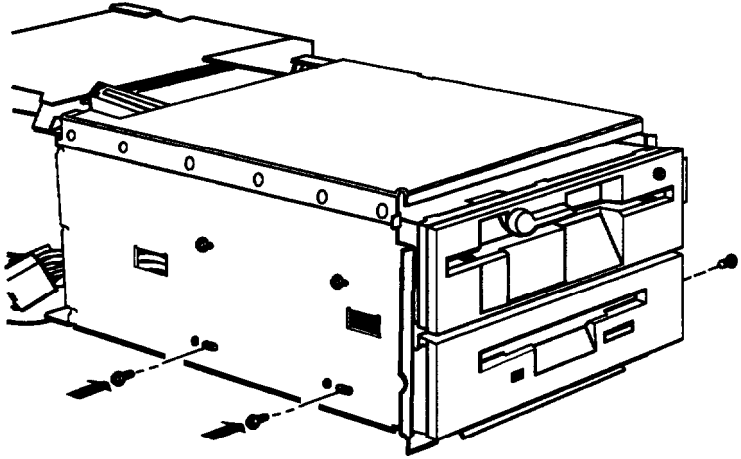
2. There are two or three holes on each side of the disk drive. When you insert the drive, align the appropriate round holes in the drive with the two oval holes on each side of the drive bay, as shown below.



3. Slide the drive into the lower drive bay, toward the back of the subassembly. Watch the oval holes on the side of the drive bay so you can see when the holes on the drive are positioned in the middle of them.

If you are installing a diskette drive, adjust its position so that the front of the drive lines up with the drive in the upper bay. (A hard disk drive fits all the way into the bay.)

4. Locate the four retaining screws that came with your disk drive. Insert two screws into the oval holes on each side of the drive bay and tighten them with a screwdriver, as shown below.

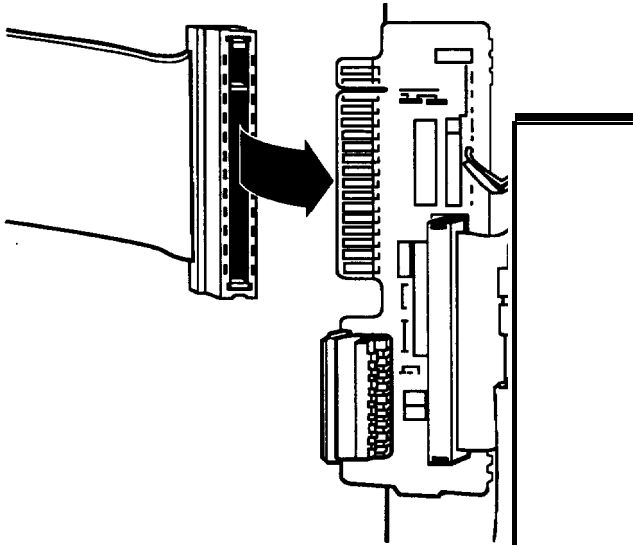


If you are installing a diskette drive, go to step 5. If you are installing a hard disk drive, go to step 6.

5. If you are installing a diskette drive in the lower drive bay, you may want to turn the subassembly upside down and place it on your work surface. Then locate the diskette drive ribbon cable; one end is connected to the top diskette drive and the other end is free. Use the connector in the middle of the cable to connect the second drive.

As shown in the next illustration, there is a large slot in this connector with a small plastic divider near one end of the slot.

The interface that protrudes from the back of the drive has gold contacts on both sides. Align the connector with the interface so that the plastic divider on the connector lines up with the gap in the interface, as shown below.



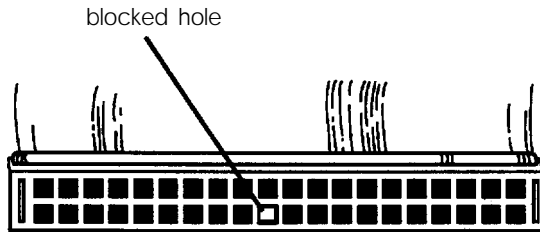
Make sure the cable connector fits properly onto the drive interface and then push it onto the interface. Then go to step 8.

Caution

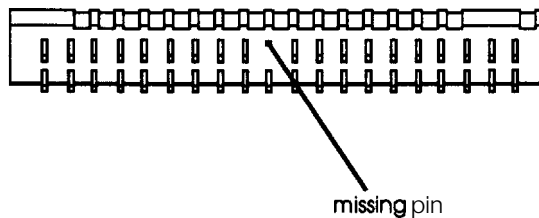
If you do not align the connector correctly, you could severely damage your diskette drive when you push it in.

6. Locate the hard disk drive ribbon cable that you removed from the drive in the vertical mounting position. Follow the instructions below to attach the connector in the middle of this cable to the horizontal hard disk drive.

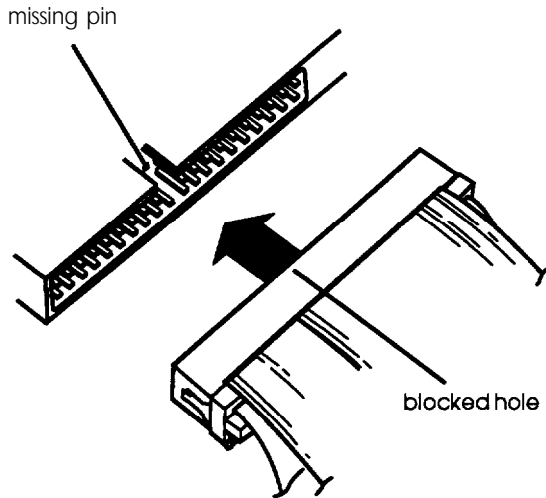
As shown below, there are two rows of holes in the connector. One of the holes is blocked with a plastic plug.



Notice the ribbon cable socket on the back of the drive; you see two rows of pins. In one of the rows, a pin is missing.



7. Align the connector with the socket so that the row in the connector with the blocked hole lines up with the row in the socket with the missing pin, as shown below. Make sure the holes fit over all the pins and then push in the connector.

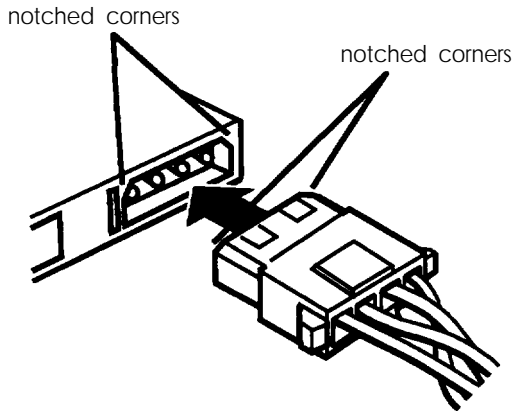


Caution

If you do not correctly align the holes with the pins, you could severely damage your hard disk drive when you push in the connector.

8. Looking at the subassembly, locate one of the power supply cables that lead from the power supply (behind the horizontal drive bays). The cables are labelled P1, P2, and P3; you can use any one.

The power supply socket on the back of the drive is next to the ribbon cable connector. Position the power supply cable connector so that the notched corners on the connector line up with the notched corners of the power supply socket on your drive. Make sure the holes fit over all the pins and then push in the connector.



Caution

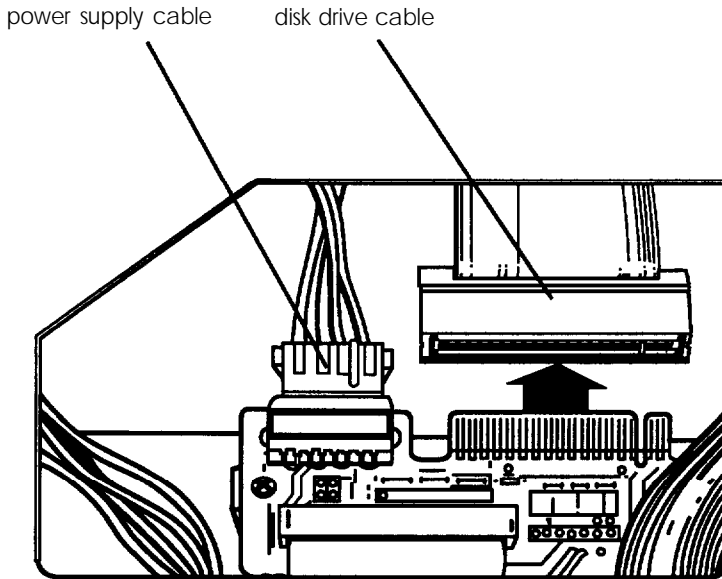
If you do not align the connector correctly, you could severely damage your diskette drive when you push it in.

9. If necessary, follow the instructions under "Installing a Hard Disk in the Vertical Position" on page 5-7 to reinstall your vertically mounted drive.

Removing a Drive From the Horizontal Position

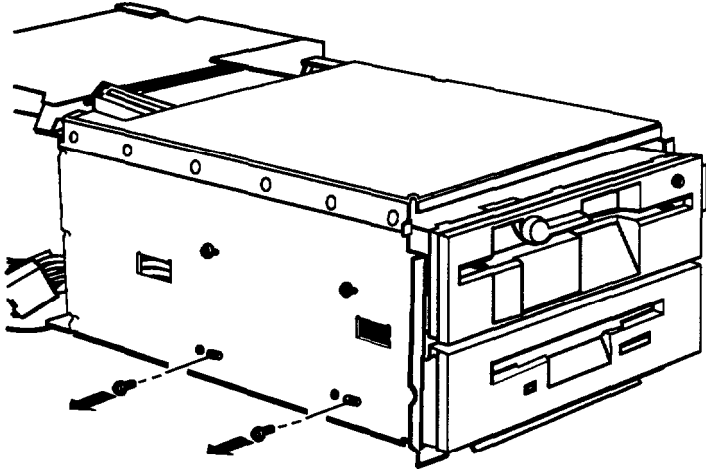
Follow these steps to remove a drive from a horizontal drive bay:

1. Remove the disk drive ribbon cable from the back of the drive, as shown below.



2. Then remove the power supply cable from the back of the drive.

3. Remove the screws securing the drive to the drive bay. There are two screws on each side.



4. Grasp the disk drive from the front of the drive bay, pull it completely out, and set it aside.
5. If you have removed one hard disk drive and are leaving another one in your system, make sure you have set the jumpers on the remaining drive to indicate that you now have only one hard disk drive. (See “Setting the Hard Disk Drive Jumpers” on page 5-4 for instructions.)
6. If necessary, follow the instructions under “Installing a Hard Disk in the Vertical Position” on page 5-7 to reinstall your vertically mounted drive.

Appendix A

Specifications

CPU and Memory

32-bit CPU	80386DX microprocessor, 33 MHz system clock speed, 33 MHz or 11 MHz processor speed; user selectable
	0 wait state memory access speed at 33 MHz
System memory	4MB RAM standard; expandable using 4MB SIMMs up to 16MB; SIMM access speed must be 80ns or faster
Cache memory	64KB cache SRAM on cache module
ROM	64KB system BIOS, 32KB VGA BIOS
Shadow RAM	128 KB, 0 wait state access speed; system ROM BIOS and video ROM can be copied into RAM through SETUP
Math coprocessor (optional)	80387DX, 33 MHz support or 3167, 33 MHz support
Clock/calendar	Real-time clock, calendar, and CMOS RAM for configuration; battery backup
Battery	Replaceable, 3.6V lithium battery; <i>3-5 year life</i>

Controllers

Diskette	Supports two drives in any of four formats: 5¼-inch, highdensity, 1.2MB; 5¼-inch, doubledensity, 360KB; 3½-inch , high-density, 1.44MB; 3½-inch , doubledensity, 720KB; controller on main board
Hard disk	Supports two drives; embedded (IDE) controllers; interface on main board

Interfaces

Monitor	VGA adapter with 512KB of video memory; supports up to 1024 x 768 pixels in 16 colors and up to 640 x 480 pixels in 256 colors; 15-pin, D-shell connector
Serial	RS-232C, programmable, asynchronous; 9-pin, D-shell connector
Parallel	Standard S-bit parallel, mono-directional; 25-pin, D-shell connector
Mouse	Mini DIN, 6-pin connector for PS/2 compatible mouse or other device
Keyboard	Mini DIN, 6-pin connector for PS/2 compatible keyboard
Option slots	Four standard input/output expansion slots (three 16-bit ISA compatible and one 8-bit ISA compatible); 8 MHz bus speed
Speaker	Internal, programmable
VGA feature connector	IBM compatible VGA pass-through connector, interface on main system board

Power Supply

Type	145W, fan-cooled, automatic input voltage sensing
Input ranges	100VAC to 125VAC and 200 to 240 VAC
Maximum	+5 VDC at 18 Amps, +12 VDC at 4.2 Amps -12 VDC at 0.3 Amps, -5 VDC at 0.3 Amps

Mass Storage

	Three half-height drives maximum (one vertical mount and two horizontal mounts) configurable using the following:
Diskette drives	5¼-inch diskette drive, 1.2MB (highdensity) storage capacity 3½-inch diskette drive, 1.44MB (highdensity) storage capacity 5¼-inch diskette drive, 360KB (doubledensity) storage capacity 3½-inch diskette drive, 720KB (doubledensity) storage capacity
I-lard disk drives	3½-inch form factor hard disk drive(s), up to half height size; the first mounted vertically, second mounted horizontally
Other devices	Half-height tape drive, CD-ROM, or other storage device; 5¼-inch or 3½-inch with 5¼-inch mounting frames

Keyboard

	Detachable, two position; 101 sculpted keys
Layout	58-key QWERTY main keyboard; 17-key numeric/cursor pad; 10 cursor keys; additional 4-key cursor pad; 16 function keys (userdefinable)
Function	Four levels (normal, shift, control, alternate); user-definable

Environmental Requirements

Condition	Operating range	Non-operating range	Storage range
Temperature	41° to 90° F (5° to 32° C)	-4° to 140° F (-20° to 60° C)	-4° to 140° F (-20° to 60° C)
Humidity (non- condensing)	20% to 90%	10% to 90%	10% to 90%
Altitude	-330 to 9900 ft (-100 to 3000 m)	-330 to 11880 ft (-100 to 3600 m)	-330 to 39600 ft (-100 to 12000 m)
Maximum wet bulb	68° F (20° C)	104° F (40° C)	134° F (57° C)

Physical Characteristics

Width	14.96 inches (374 mm)
Depth	17.32 inches (433 mm)
Height	6.16 inches (154 mm)
Weight	Single diskette drive model without keyboard: 21 lb (9.6 kg)

System Memory Map

000FFFFFFh	System BIOS ROM: 64KB Duplicated from 0F0000h	
000F0000h	Reserved for system board: 64KB Duplicated from 0E0000h	
000FE0000h	Extended memory	16MB (Maximum system memory)
00100000h	System BIOS ROM: 64KB Default Shadow RAM Duplicated at FF0000h	1MB
000F0000h	Reserved for system board: 64KB Duplicated at FE0000h	
000E0000h	I/O Expansion ROM: 96KB Reserved for ROM on I/O adapters	
000C8000h	VGA BIOS ROM: 32KB Default Shadow RAM	
000C0000h	Video memory: 128KB Reserved for graphics display buffer	
000A0000h	Conventional system memory: 640KB	640KB
00000000h		

Performing System Diagnostics

This appendix describes how to use the System diagnostics program to test the condition of your computer's main unit and peripheral devices. The diagnostics program provides tests to check the following hardware:

- System board
- Memory
- Hard disk drive(s)
- Diskette drive(s)
- Keyboard
- Video adapter and monitor
- Parallel and serial ports.

By changing settings on the System diagnostics main menu, you can run the tests in several different ways. You can specify a certain length of time to run a test, select to run it continuously until you interrupt it, or specify a number of times to run the test.

If an error occurs during a test, note the error message and contact your Epson dealer. Your dealer may be able to solve the problem; if not, see "Where to Get Help" in the Introduction for technical support information.

Starting the Diagnostics Program

To start the diagnostics program, follow these steps:

1. Insert the Reference diskette in drive A and turn on or reset the computer.
2. When you see the following prompt, press the **Delete** key:

Press **** to start **SETUP**

3. At the next prompt, select Start **operating system**
4. If necessary, verify the date and time. At the A: prompt, type **DIAG** and press **Enter** to run System diagnostics. You see a title screen.
5. Press any key to continue. You see the main menu.







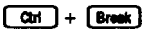





The Main Menu Screen

System board	Memory	Hard disk	Floppy	Keyboard	Video	Misc.
Basic functionality test CPU protected mode test Processor speed test						
Coprocessor test DMA controller test Interrupt controller test Timer test Realtime clock test CMOS validity test						
Run tire parameters						
Testing mode : (T)imebound / (C)ontinuous / (P)assbound ? PWait on error (Y/N) ? Y Error logging (Y/N) ? N No. of passes : 00001						
Prev/Next window → ← Prev/Next test ↑ ↓ Run highlighted test <Enter> Exit <Esc> Set parms <F2> Sel/desel <F3> test Sel all Desel all <F5> Run sel tests <F6>						
Tests basic operation of CPU in real mode						

When you select a test category from the option line at the top of the menu, you see a submenu of the available diagnostic tests. For example, the submenu for the System board category appears when you first see the main menu because the System board option is selected.

The Run tune parameters window, near the bottom of the display, lets you specify how you want to run the test(s).

The help window describes how to use these keys to make menu selections and run diagnostic tests:

Key	Function
	Move to the next test category
	Move to the previous test category
	Move to the next test
	Move to the previous test
	Start the test
	Exit the diagnostics program or run time parameters box
	Cancel a selected test in progress
	Set the run time parameters
	Select a test or cancel selection
	Select all tests
	Cancel all selections
	Run all selected tests

A short message describing each test appears at the bottom of the screen.

Setting the Run Time Parameters

The tests you select will run in the following manner unless you change the run time parameters:

- Each test is performed one time (passbound)
- The program waits if an error occurs
- No errors are recorded to the printer, disk, or other device.

If you want to change the default run time parameters, press **F2** to move to the Run time parameters window. (Press **Esc** at any time to exit and return to the submenu of diagnostic tests.)

The first run time parameter specifies the mode in which to run the test. You see this prompt:

```
Testing mode: (T)imebound / (C)ontinuous /  
(P)assbound ? P
```

In Timebound mode, the program runs the tests for the amount of time you specify; press **T** and then **Enter**.

In Continuous mode, the tests run until you interrupt them; press **C** and **Enter**.

In Passbound mode, the program runs the tests the number of times you specify. This is the default setting; press **P**, if necessary, and **Enter** to select the mode.

The next option is:

```
Wait on error (Y/N) ? Y
```

Press **Y** and **Enter** if you want the program to pause when an error occurs. This lets you view the error message, make note of it, and then press **Enter** to continue. (Y is the default setting.)

Press **N** and **Enter** if you want the diagnostics program to continue when an error occurs.

The next option is:

Error logging (Y/N) ? N

Press **Y** and **Enter** to record the errors that may occur during the test. See “Error Logging,” below, for details.

Press **N** and **Enter** if you do not want to create the error log. (N is the default setting.)

Note

If you press **N** at the **Wait on error** prompt, you should press **Y** for **Error logging** so you can review any errors that may occur during the tests.

You may see a prompt requesting additional information that the program needs to perform the test(s).

If you selected Continuous testing, the diagnostics program needs no additional information. Instead, you see this message in the Run time parameters window:

Test mode: continuous

If you selected Timebound testing, you see this prompt:

Period :001 hr 00 min

To specify the amount of time you want to run the test(s), type the number of hours (from 000 to 999), and press **Enter**. Then type the number of minutes (from 00 to 59), and press **Enter**. You can use the backspace key to make corrections.

If you selected Passbound testing, you see this prompt:

No. of passes : 00001

Specify the number of times (from 1 to 65535) you want to run the test(s), or press **Enter** without entering a number to select the default of one pass. You can use the backspace key to make corrections.

Note

In most cases, running a test once is sufficient. Multiple passes test the reliability of essential functions only.

Error Logging

When you request error logging, you see this submenu:

Log errors on disk
Log errors to printer (LPT1)
Log errors to serial port
No error logging

Press **↑** or **↓** to highlight the device on which you want the program to log the error messages and press **Enter**. (Press **Esc** to exit the menu and return to the Error logging prompt.)

If you select **No** error logging, the program changes the **error logging response** from **Y** to **N**.

If you select the printer (LPT1), the program writes the error messages to the device connected to the parallel port **assigned** LPT1. If you select the serial port, the program writes the error messages to the device connected to the COM1 serial port.

If you select **Log errors on disk**, the program displays this submenu:

Floppy disk A:
Floppy disk B:
Hard disk C:
Hard disk D:

(You do not see drive D unless you have a second hard disk drive.) Press or to highlight the disk on which you want to log the error messages and press . The program creates a file called ERROR.LOG in the current directory of the specified disk drive. After running the tests, you can open the ERROR.LOG file to review the errors that occurred during the tests.

The program uses this device for error logging until you change it or indicate you do not want error logging. When you specify a new device, the program erases the existing ERROR.LOG file, if any.

When you specify the device for error logging, one of these error messages may appear:

Floppy disk A not present
Floppy disk B not present
Hard disk C not present
Printer port not present
Serial port not present
Error in printer status
Error in serial port status
Error in floppy drive A

Record the error message and select a different device for error logging.

Once you set the run time parameters, you are ready to select the test(s).

Selecting Diagnostic Tests

To start a single test, press **→** or **←** to highlight the test category on the main menu. Then press **↓** or **↑** to highlight the particular test in the submenu and press **Enter** to run it. When a test has been completed, you see this prompt:

Press **<Enter>** to return to Main menu.

Selecting Multiple Tests

To select several tests at one time, highlight each test you want to perform and press **F3**. To cancel a selection, highlight the test and press **F3** again.

To run the selected group of tests, press **F6**. The program highlights each test name as it runs the test.

You can press **F4** to select all tests for all devices, and press **F5** to cancel all selections.

You cannot run certain tests along with other tests. The table below lists the tests that must be run individually.

Diagnostic tests to be run individually

Category	Test
System board	Timer test Real time clock test
Hard disk	Hard disk format Media analysis Force bad tracks
Floppy	Disk change line test
Keyboard	Scan/ASCII code test
Miscellaneous	Printer adapter test Comm. adapter test

You can stop testing at any time and return to the main menu by holding down **Ctrl** and pressing **Break**. The program completes the current test before it stops.

You must enter certain parameters to run the hard disk and diskette drive tests. If you use **F3** to select these tests, the program prompts you for the parameters immediately. If you use **F4**, the program prompts you for the parameters during the first pass of the test. If you perform the tests more than once, the program uses the same parameters for each pass.

If you selected Passbound testing, the program displays the pass number on the right side of the screen above the Run time parameters window. For example:

Pass : 00001

If you entered **Y** at the **wait on error prompt**, the **program pauses if an error occurs. When you press Enter**, the program continues testing.

Note

Tests selected with **F3** and **F4** remain selected until you cancel them. Be sure to press **F5** to cancel all selections when you are finished running each set of tests.

Running the Tests

The table below lists all of the available System diagnostic tests and may refer you to other sections in this chapter for additional information.

System diagnostic tests

Component	Tests	Function
System board	Basic functionality	Tests components such as Instructions, registers, and flags of CPU
	CPU protected mode	Tests protected mode instructions such as LSL, VERR, and LAR
	Processor speed	Identifies current clock speed
	Coprocessor	Tests the coprocessor
	DMA controller	Tests memory address and page registers of DMA controllers 1 and 2
	Interrupt controller	Tests interrupt mask registers
	Timer	Compares timer count to RTC
	Real-time clock	Compares RTC to time 0 interrupt
	CMOS validity	Tests the CMOS RAM
Memory	BIOS ROM	See 'Memory Diagnostics' Tests data path of BIOS ROM
	Parity	Checks for memory parity errors
	Pattern	Tests for memory read/write faults
	Walking 1	Checks data lines for shorts and bits that are 1

System diagnostic tests (continued)

Component	Tests	Function
Memory (continued)	Walking 0	Checks data lines for shorts and bits that are 0
	Address	Checks for address line shorts
	Refresh	Checks the refresh interval
Hard disk drives	Hard disk format Media analysis Performance Seek Read/verify Check test cylinder Force bad tracks	See 'Hard Disk Diagnostics'
Floppy disk drives	Diskette format Drive speed Random read/write Sequential read/write Disk change line	See 'Floppy Disk Diagnostics'
Keyboard	Controller	Tests the keyboard controller
	Scan/ASCII code	Tests the scan codes assigned to the keys
	Keyboard clock line	Tests the keyboard clock line
	Keyboard data line	Tests the keyboard data line
Video	Adapter	Tests the display adapter memory
	Attribute	Tests the display adapter attributes
	80 x 25 display	Tests the 80 x 25 display
	40 x 25 display'	Tests the 40 x 25 display
	320 x 200 graphics'	Tests the 320 x 200 graphics display
	640 x 200 graphics*	Tests the 640 x 200 graphics display

* Test appears only if you have installed a color monitor.

System diagnostic tests (continued)

Component	Tests	Function
Video (continued)	Page selection*	Tests the paging function of the adapter
	Color'	Tests the background and border color mapping
	640 x 350 graphics*	Tests the 640 x 350 graphics display
	640 x 480 graphics'	Tests the 640 x 480 graphics display
Misc.	Printer adapter Comm. adapter	See 'Miscellaneous Diagnostics'

. Test appears only if you have installed a color monitor.

Memory Diagnostics

If you have relocated any memory addresses, you must change the addresses to their original locations before running the memory tests or they will not work properly. If an error occurs during a memory test, the program displays this message:

Press <Enter> to view faulty memory chip.

Press **Enter**. The program displays a diagram of the main system board and highlights the faulty memory chip.

Hard Disk Diagnostics

Hard disk diagnostic tests fall into two categories: destructive or nondestructive. Destructive diagnostics destroy data on the hard disk, but nondestructive diagnostics do not. Be sure to back up any data on your hard disk before performing any destructive tests. The following table lists which tests are destructive and which are not.

Destructive tests	Non-destructive tests
Format Media analysis Force bad tracks	Performance Seek Read/verify Check test cylinder

Before it executes any destructive test, the program displays the following messages:

W A R N I N G

**All data on hard disk you have Specified
may be lost...**

Do you still want to continue (Y/N)?

Press **Y** and **Enter** to begin the test. Press **N** and **Enter** to stop the operation.

Caution

You should not run any of the destructive tests on a SCSI hard disk drive.

Hard Disk Parameters

The hard disk diagnostic program may ask for the following parameters:

- Disk drive identifier
- Disk drive type
- Interleave factor
- Bad track list
- Start cylinder number
- End cylinder number
- Start head number
- End head number

Each parameter is described below.

Disk drive identifier

You see this prompt for the disk drive identifier:

```
Disk drive (C/D) ? C
```

If you have only one hard disk drive, the program assumes it is drive C and does not display this prompt.

Disk drive type

The program determines the type of hard disk drive based on the type number stored in the CMOS RAM by the SETUP program and displays the following prompt:

```
Disk drive type ? 39
```

A window on the screen lists **the possible** drive types. If you need to change the type, use or to **highlight the** drive type that matches your hard disk and press .

If you select the User defined option (type 47), the program prompts you for the following information:

- Number of cylinders
- Number of heads
- Number of sectors per track
- Write precompensation presence
- Write precompensation cylinder number
- Landing zone.

Interleave factor

The interleave factor affects the performance of your hard disk. You see the following prompt:

Interleave (1-16) ? 3

Enter 1 if you are using an Epson IDE hard disk drive or enter the number your hard disk documentation recommends.

Bad track list

Entering the bad track list is optional. The program displays the following prompt for the bad track list:

Mark bad tracks (Y/N) ? N

You do not need to enter a bad track list for the hard disk that comes with the **Equity** 386/33 PLUS. Press **N**, if necessary, and then press **Enter**.

If you press **Y** and then **Enter**, you see this submenu:

- Add an entry**
- Revise an entry**
- Delete an entry**
- Clear bad track list**
- Save and Exit**

Use or to highlight a menu option and press . Then enter the correct track information. When the bad track list is correct, highlight **Save and Exit** and press .

Note

When you run the Media analysis test, the program automatically marks the bad tracks when it formats the disk.

Start and end cylinder numbers

The program displays the following prompts for the starting and ending cylinder numbers:

```
Start cylinder number ?      0
End cylinder number ?      nnn
```

Enter the first and last cylinder numbers on which you want to perform the tests. The default for the start cylinder number is 0, and the default for the end cylinder number is one less than the highest cylinder number of your hard disk. For example, on the 40MB hard disk, the highest cylinder number is 976.

Start and end head numbers

The program displays the following prompts for the starting and ending head numbers:

```
Start head number      ?      0
End head number       ?      nn
```

Enter the first and last head numbers on which you want to perform the tests. The default for the start head number is 0, and the default for the end head number is one less than the highest head number of your hard disk. For example, the default end head number for the 40MB disk is 4.

After you specify the hard disk parameters, press and at the **Proceed** prompt to run the test.

Hard Disk Format

The Hard disk format program performs a low-level format on your hard disk. If your computer came with a factory-installed hard disk or if you have installed an optional Epson hard disk, it has already been formatted for you.

You may need to format the hard disk if you have installed a new, non-Epson hard disk in your computer that has never received this type of low-level format and did not come with its own format utility.

You must still partition and format the hard disk for the operating system after performing this low-level format. See your operating system manuals for instructions.

Caution

The hard disk format procedure destroys any data on your hard disk.

You may want to reformat a hard disk if you have a serious problem with the drive. However, before formatting a disk with data on it, try every other recovery procedure described in your operating system manuals. Then back up all the data on the disk before you begin.

Note

If you do not enter a bad track list before you format the disk, the format program analyzes the surface of the hard disk to determine the bad tracks.

Media Analysis

This test identifies the bad tracks on the hard disk by analyzing the surface of the disk to find them. The program uses three different bit patterns; formatting the disk, marking the bad tracks, and displaying the bad track list.

Caution

The Media analysis test destroys any data on your hard disk.

Performance Test

This test checks the performance of your hard disk by determining the data transfer rate and track-to-track seek time based on the transfer size, the seek count, and the amount of data transferred. The program measures the data transfer rate in kilobytes per second. It reads 64KB of data 15 times and counts the number of timer ticks using this formula:

$$\text{Transfer rate} = (64\text{KB} \times 15 \times 18.2) / \# \text{ timer ticks}$$

The program measures track-to-track seek time in milliseconds using this formula:

$$\text{Seek time} = (\# \text{ timer ticks} \times 1000) / 18.2 \times 200$$

The number of seeks in this example is 200. A higher data transfer rate and a lower seek time indicate better disk performance.

Seek Test

This test checks the seek capability of the hard disk on the specified range of cylinders and heads. The program performs a series of sequential seeks followed by random seeks and reports any errors.

Read/Verify Test

This test checks the read and verify capability of the hard disk on the specified range of cylinders and heads. The program performs both sequential and random read and verify operations and reports any errors.

Check Test Cylinder

This test checks the test cylinder, which is the last cylinder on the hard disk. You should perform this test if you receive a hard disk error when you boot the system.

Force Bad Tracks

Use this test to mark bad tracks on the hard disk without formatting it.

Caution

The Force bad tracks test destroys any data on your hard disk.

Hard Disk Error Messages

The diagnostics program displays two types of error messages while testing the hard disk: messages the program generates and those the controller generates.

The following message appears if you try to run the Performance Test with less than 128KB of available memory:

```
Insufficient memory for data transfer  
Minimum memory required is - 128KB
```

The controller displays one of the following messages when an error occurs during a diagnostics procedure:

Address mark not found
Attachment failed to respond
Bad ECC on disk read
Bad sector flag detected
Controller has failed
Drive activity failed
ECC corrected data error
Requested sector not found
Reset failed
Seek operation failed
Write fault on selected drive

If you see one of these error messages, check the drive, controller, cables, and power connectors. If you still get an error, contact your dealer.

Floppy Disk Diagnostics

Floppy disk diagnostic tests may be destructive or non-destructive. Destructive diagnostics destroy data on the diskette, but non-destructive diagnostics do not. The following table lists which tests are destructive and which are not.

Destructive tests	Non-destructive tests
Diskette format Random R(ead/W(rite) Sequential R(ead/W(rite)	Drive speed Drive change line

Performing the Tests

The Diskette format test checks the format capability of the diskette drive and its controller. In order to run the test, you need a blank diskette that has been formatted using the MS-DOS FORMAT command and that is not write-protected. When the program prompts you to insert a diskette, insert the newly formatted one.

Once the Diskette format test is completed successfully, you must use the test diskette to run any of the tests in the following table. These tests will not run properly unless the diskette has been previously used for the Diskette format diagnostic test.

Tests requiring a specially formatted diskette

Test	Function
Drive speed test	Verifies how fast the diskette drive rotates a diskette. A 1.2MB, 5 ¹ / ₄ -inch diskette drive should rotate a 1.2MB diskette at 360 RPM and a 360KB diskette at 300 RPM. A 1.44MB, 3 ¹ / ₂ -inch drive should rotate a diskette at 300 RPM. (Tolerance allowed: one percent.)
Random R(ead)/W(rite) test	Checks the random seek capability of a diskette drive by performing a random read/write operation.
Sequential R(ead)/W(rite) test	Checks the sequential seek capability of a diskette drive by performing a sequential read/write operation.
Drive change line test	Tests the status of the disk change line that detects when you insert or remove a diskette from a drive.

Note

Be sure to insert a blank diskette that has been formatted before you run the Diskette format test. Then use that diskette when you run any of the other destructive tests. Check that you have inserted the correct diskette before you press **Y** at the Proceed prompt.

You see the following prompt before the program performs a test:

Diskette drive (A/B) ?

If necessary, type the drive identifier and press **Enter**. (If you have only one diskette drive, drive A is already entered for you.) Press **Y** and **Enter** at the **Proceed** prompt to begin the test. Press **N** and **Enter** to return to submenu.

Note

When you are finished running any of these tests on the test diskette, you must reformat it before you can use it.

Floppy Disk Error Messages

The diagnostics program displays two types of error messages while testing a diskette drive: messages the program generates and those the controller generates.

The program may display the following error message during the Disk change line test:

Warning - Change line inoperational

This message appears if the line is not working properly and may indicate a problem in the drive or its controller.

You may see the following message if you attempt to run the Change line test on a drive that does not support a change line, such as a 360KB or 720KB drive:

Change line not available

The controller displays one of these messages when an error occurs during a **diagnosticsprocedure**:

Bad address mark
Bad CRC error
Bad DMA error
Bad seek error
Diskette write Protected
Media change error
Record not found
Timeout error

These errors could occur because of a faulty drive, controller, or cable, or if you attempt to run a test on a write-protected or unformatted diskette.

Miscellaneous Diagnostics

These tests are listed in the Miscellaneous diagnostics submenu to provide a complete check of the parallel and serial ports:

Printer adapter test
Comm. adapter test

Printer Adapter Test

This test checks the parallel port and the printer by sending a pattern to the printer. If the printer does not print the pattern, the test has failed.

Before running the test, be sure that the printer is on-line, paper is loaded, and all connections are secure, or you may see one of the following error messages:

Error - Printer out of paper
Error - Printer not selected
Error - Printer interface I/O error
Error - Time out on printer

Communication Adapter Test

Before running this test on your serial port, you must connect a special RS-232C, AT-type loopback connector to the port. This connector enables the test to send out data and receive the same data back on one line. You can purchase the connector from most electronic supply stores.

Be sure the connector is configured with the following settings:

- RD and TD shorted
- DSR and DTR shorted
- CTS and RTS shorted.

This test resets the computer to check for possible errors. Then it checks the port by sending and receiving data and testing the following port parameters:

- 9600 baud rate
- Oddparity
- 2 stop bits
- 8-bit data length.

If you see one of the following errors, there may be a problem with the controller or the test cable:

Error - Break detected
Error - Framing error
Error - Overrun *error*
Error - Parity error
Error - Time out!

Check to make sure that the test connector is securely connected to the port. If the error persists, contact your dealer.

Exiting System Diagnostics

To exit from the System diagnostics program, press **Esc**. You see the following prompt:

Do you want to exit diag (Y/N)? N

Before you press a key, remove the Reference diskette from drive A. If you do not have a hard disk, **insert** your system diskette in the drive. Then press **Y** and **Enter** to exit the program. You see this message:

Stand by while system is rebooting.

The computer loads the operating system.

Appendix C

Troubleshooting

You should not encounter any difficulties as you set up and use your computer, but if anything out of the ordinary happens, refer to this appendix. You can correct most problems by adjusting a cable connection, repeating a software procedure, or resetting the computer.



Besides trying the suggestions in this chapter, you can run diagnostics checks on the various components of your computer system. See Appendix B for instructions. If the suggestions here or in Appendix B do not solve the problem, see “Where to Get Help” in the Introduction.

Identifying Your System

When you request technical assistance, be ready to provide the serial number of your computer, its ROM BIOS version number, its configuration (including the type of disk drives, monitor, and option cards), and the names and version numbers of any software programs you are using.

You can find the serial number on the computer’s back panel. If you are able to use your computer, follow the steps below to obtain information about your configuration, as well as your ROM BIOS and MS-DOS (or other operating system) version numbers.

1. If you do not have a hard disk, insert the MS-DOS Startup diskette (or other system diskette) in drive A.
2. Turn on your computer or press the **RESET** button to reboot it.

3. When the computer performs the power-on memory test, the version number of your system ROM BIOS appears at the bottom of the screen. Quickly write down the version number. If you do not have enough time to write down the entire number, press **RESET** and try again.
4. When you see **Press to start SETUP, press the  key**. Write down the appropriate information about your configuration shown on the main SETUP menu. Then exit SETUP (**without saving** the configuration).
5. If you are **using** MS-DOS, at the command prompt type **VER** and press **** to display the MS-DOS version number. Write it down.

Error Messages

Your computer's built-in memory (ROM) contains a series of diagnostic programs, called power-on diagnostics, which your computer runs automatically every time you turn it on. These programs check internal devices such as ROM, RAM, the timer, the keyboard controller, and the hard disk drive.

The RAM test program displays the total amount of memory currently installed in your system. If the computer finds an error, it displays an error message on the screen. Write down the error message and give it to your dealer when reporting a problem.

If the error is serious, the computer cancels further checking and halts system initialization. The error message remains on the screen and the computer locks up. If this happens, contact your dealer as soon as possible. Report this information and both the error message and code number to your dealer.

The following tables list error codes and messages that may appear during power-on diagnostic checks. If you receive an error message, look it up in the tables below; they direct you to the proper troubleshooting section in this appendix or offer a solution. If you do not see an error message, read the section that covers your problem.

Power-on diagnostics error messages

Error message	Beeps	Action
8042 Gate-A20 error		Write down message, contact dealer
Base 64KB RAM failure	3	Write down message, contact dealer
C: Drive error		See 'Hard Disk Problems'
C: Drive failure		See 'Hard Disk Problems'
CH-2 timer error		Write down message, contact dealer
CMOS battery state low		See 'Battery Problems'
CMOS checksum failure		Run SETUP as described in Chapter 2 of the <i>Setup Guide</i> . If error recurs, write down message and contact dealer
CMOS display type mismatch		See "Monitor Problems"
CMOS inoperational		Write down message, contact dealer
CMOS memory size mismatch		Run SETUP as described in Chapter 2 of the <i>Setup Guide</i> . If error recurs, write down message and contact dealer
CMOS system options not set		Run SETUP as described in Chapter 2 of the <i>Setup Guide</i> ; then see 'Battery Problems'
CMOS time and date not set		Run SETUP and enter time and date; see <i>Setup Guide</i> , Chapter 2
D: Drive error		See 'Hard Disk Problems'

Power-on diagnostics error messages (continued)

Error message	Beeps	Action
D: Drive failure		See "Hard Disk Problems"
Display switch setting not proper		See "Monitor Problems"
DMA error		Write down message, contact dealer
DMA #1 error		Write down message, contact dealer
DMA #2 error		Write down message, contact dealer
DRAM refresh failure	1	Write down message, contact dealer
FDD controller error		Run SETUP and enable the FDD setting; see <i>Setup Guide</i> , Chapter 2
HDD controller error		Run SETUP and enable the HDD setting; see <i>Setup Guide</i> , Chapter 2
Invalid switch		Write down message, contact dealer
Keyboard controller Gate-A20 error	6	Write down message, contact dealer
Keyboard error		See "Keyboard Problems"
Keyboard interface error		See "Keyboard Problems"
Keyboard is locked ... Unlock it		Write down message, contact dealer
Memory failure		Write down message, contact dealer
Processor failure	5	Write down message, contact dealer
ROM BIOS checksum check	8	Write down message, contact dealer
System timer failure	4	Write down message, contact dealer
Virtual mode exception error	7	Write down message, contact dealer

Other error conditions

Beeps	Cause	Action
1 long; then 3 short	Error with conventional or extended memory	See "Memory Module Problems"
1 long; then 8 short	Failure in video RAM; or vertical and horizontal retrace	Write down message, contact dealer

The Computer Won't Start

If your computer does not start when you turn on the power, check the following:

1. Is the power light on? If not, remove any diskettes and turn off the power. Make sure the power cord is securely connected to both the AC inlet on the back panel and an electrical outlet. Replace the system or Reference diskette, if necessary, and turn on the computer again.

Caution

If you turn off the computer, always wait at least five seconds before turning it back on. This allows the computer to clear and reset its memory.

2. If the power light still does not come on, check the electrical outlet for power. Turn off your computer and unplug the power cord from the wall outlet. Plug a lamp into the outlet, and turn it on to see if the outlet supplies power.
3. If you installed or removed any of your system components, such as a disk drive, check to make sure you have reconnected all the internal and external cables correctly.

4. If the electrical outlet is working and all **the** connections are secure but your computer still won't start, call your dealer.

Note

If the computer starts but you can't see anything on the screen, see "Monitor Problems," on page C-10.

The Computer Does Not Respond

If your computer locks up and does not respond when you type on the keyboard, follow these steps:

1. Wait a few moments; some operations take longer than others to complete. For example, the computer takes longer to sort a database than to accept a single typed character. If your computer still does not respond after a reasonable length of time, proceed to the next step.
2. Your computer may take a long time to complete its power-on diagnostics if you have just made a change in your system's configuration. The first time you turn on your computer after making such a change, it can take several minutes to finish its self test, depending on what you changed. If the computer does not display the MS-DOS prompt after five minutes, press the **RESET** button and try again. If that doesn't work, insert the Reference diskette in drive A and press the **RESET** button. If the computer still does not boot, contact your Epson dealer.
3. Did you disconnect **the** battery to replace it? Insert the Reference diskette in Drive A and press **RESET**. Then run **SETUP** as described in Chapter 2 of the Setup Guide and make sure the settings are correct. Be sure to save your **SETUP** information when you exit the program.

4. Did you enter the correct password? See “Password Problems,” below.
5. Could your software be causing the problem? If you are running an application program, see “Software Problems,” later in this appendix.
6. The problem could be caused by your keyboard. See “Keyboard Problems,” later in this appendix.
7. If you want to stop whatever the computer is doing and return to the MS-DOS command prompt, hold down the **Ctrl** key and press **Break** (or press **C**). See Chapter 1 for more information on stopping a command or program.
8. If your computer still does not respond, you can reset it using the **Ctrl** **Alt** **Delete** command or the RESET button. See “Resetting Your Computer” in Chapter 1 for more information.
9. If resetting the computer does not work, turn it off and wait at least five seconds. If you do not have a hard disk drive, insert the system or Reference diskette in drive A. Then turn on the computer. It should load your operating system.
10. If you installed a display adapter card in your computer, and you want to use that adapter as your primary display adapter, you need to change the setting of jumper J1 on the main system board to disable the built-in VGA adapter. If you have not set the jumper, you will not see any display on the screen. You may also need to set jumper J4. See “Changing the Jumper Settings” in Chapter 4 for instructions.

Password Problems

If you set a password using the SETUP program, you must enter it before you can use the system. When you turn on the computer, it runs a memory test. Then the screen displays the Enter **Password** prompt. If you do not enter the correct password, you cannot use the computer. If you have any trouble using your password, try the following:

- ❑ If you type the password and press **Enter** but nothing happens, type it again and press **Enter**.
- ❑ If you know the current password but you want to change or delete it, see Chapter 2 in the *Setup Guide* for instructions.
- ❑ If you do not know the current password, follow the steps below.

Accessing Your Current Password

If you have forgotten your current password and cannot use your computer, follow these steps:

1. Turn off the computer and follow the instructions under “Changing the Jumper Settings” in Chapter 4 to disable the password function by setting jumper J3 to position A.

Caution

Be sure to ground yourself on the back inside panel of the computer before touching any of the interior components. Always replace the cover on the computer before you turn it on again.

2. Turn on the computer. You do not see the Enter Password prompt.

3. When the **Press to start SETUP** prompt appears, press **Delete**.
4. Highlight **Run SETUP** and press **Enter**. You see the SETUP menu.

Follow the instructions in Chapter 2 of the *Setup Guide* to either set a new password or select Not Installed (if you do not want to set a new password). Be sure to **save your SETUP** information when you exit the program.

5. Turn off the computer and follow the instructions under “Changing the Jumper Settings” in Chapter 4 to enable the password function by setting jumper J3 to position B.
6. If you do not have a hard disk, insert the system diskette in drive A. Turn on the computer.

If you set a new password, you see the Enter **Password** prompt. Enter the password to access your system. (See “Using the Password” in Chapter 1.)


If you did not set a new password, you do not see the Enter Password prompt and you can access your system immediately.

Note

Be sure to remember your new password or write it down and keep it in a safe place. If you forget the password you enter now, you may have to repeat the above procedure the next time you reboot your computer.

Keyboard Problems

If you are having trouble with the keyboard, check the following:

1. If the screen displays a keyboard error when you turn on or reset the computer, make sure the keyboard is securely connected to its port. See “Connecting the Keyboard” in Chapter 1 of the *Setup Guide* for instructions.
2. If the cursor keys do not work properly, the num lock function may be on. When num lock is on, the numeric /arrow keys on the numeric keypad work only as numbers. Check to see if the Num Lock indicator in the **upper right** corner of the keyboard is lit; if it is, press the  key to turn off the function.
3. If nothing happens when you type on the keyboard, see “The Computer Does Not Respond,” above.
4. If you are still having trouble with your keyboard, run the Keyboard diagnostic tests described in Appendix B. If the diagnostics indicate an error, contact your dealer.

Monitor Problems

For monitor problems, check the following:

1. If there is no display on the screen, check that the monitor’s power switch is on and that the power light on the monitor is lit. If the power light is on but you still do not see anything on the screen, check the monitor’s brightness and contrast controls.
2. If the power switch is on but the power light is not, turn off the monitor’s power, wait five seconds, and turn the power back on. Wait to see if the screen displays any text.

3. If the monitor's power light still does not come on, check the electrical outlet for power. Turn off your monitor and unplug it from the wall outlet. Plug a lamp into the outlet and turn it on to see if the outlet supplies power.
4. If you still do not see anything on the screen, make sure your monitor is connected to the computer properly. See "Connecting a Monitor" in Chapter 1 of the *Setup Guide* for more details. Also check the monitor manual for instructions on how to connect it to the computer.
5. Make sure your monitor and display adapter match, and, if you installed a display adapter card, be sure its switches or jumpers are set properly. See "Connecting a Monitor" in Chapter 1 of the *Setup Guide* and the monitor and display adapter card manuals for instructions.
6. Be sure you have chosen the correct display adapter type in the *SETUP* program. See "Setting the Primary Display Type" in Chapter 2 of the *Setup Guide*.
7. If you are running an application program, see, if you need to set up the program for the type of monitor and display adapter you have. Also make sure you are using the appropriate monitor and display adapter for your software.

Note

If your application program requires a monitor that supports graphics but you have a monochrome monitor, the results may be unpredictable.

8. If you installed a display adapter card in your computer, and you want to use that adapter as your primary display adapter, you need to change the setting of jumper J1 on the main system board to disable the built-in VGA adapter. Otherwise, you will not see any display on the screen. You may also need to set jumper J4. See “Changing the Jumper Settings” in Chapter 4 for instructions.
9. If you are still having difficulty with your monitor, run the Video diagnostic tests, described in Appendix B. If the diagnostics program indicates an error, contact the place where you bought the monitor.

Diskette Problems

If you see an error message or have trouble accessing data on a diskette, try the following steps:

1. You may have inserted the diskette upsidedown or it may not be inserted all the way. Remove the diskette from the drive and reinsert it with the label facing up. If the diskette drive has a latch, be sure to turn it down to secure the diskette in the drive. (See Chapter 1 for detailed instructions on inserting and removing diskettes.)
2. If reinserting the diskette does not solve the problem and you have access to another diskette drive of the same type, place the diskette in the other drive and repeat the operation. If this works, the trouble may be in your diskette drive. See “Diskette Drive Problems,” below.
3. Check to see if you have inserted the right type of diskette. For example, are you trying to read a 1.44MB diskette in a 720KB diskette drive? See “Types of Diskette Drives” in Chapter 1 for more information.

4. If your diskette is the right type for your drive, see if it is write-protected. On a 5¼-inch diskette, there may be a write-protect tab over the notch on its side or there may be no notch. On a **3½-inch** diskette, the write-protect switch may be set to the write-protect position or there may be no switch. You cannot alter data on a write-protected diskette. (Some application programs do not function properly if the diskette is write-protected. Check the program manual.) See Chapter 1 for information.
5. Is the diskette formatted? A new diskette must be formatted before you can store data on it. See your operating system manuals for instructions on formatting diskettes.
6. You may have entered an incorrect diskette drive type when you ran the SETUP program. Run SETUP again to check the setting. See Chapter 2 of the *Setup Guide* for instructions.
7. Did you receive one of the following MS-DOS error messages?

Disk Drive Error: Abort, Ignore, Retry?
Disk error reading drive d:
Disk error writing drive d:

If you see one of these messages, make sure the diskette is properly inserted in the drive. If the problem persists, try removing the diskette and reinserting it.

If the error message still occurs, you may have a defective diskette. Try copying the files from the bad diskette to a new diskette.

8. If you see no error messages but there is something wrong with the data in a file, the operating system or an application program may have updated the storage information on the diskette incorrectly. This is probably the case if you have one of these problems:
 - ❑ Part of a file is missing
 - ❑ A file includes parts of other files
 - ❑ An expected output file is missing.

If you are using MS-DOS, use CHKDSK to make the necessary repairs; see your MS-DOS manuals for instructions.

Diskette Drive Problems

If you see an error message or have difficulty with a diskette drive, check the following:

1. If you are having problems with a new diskette drive that your dealer installed for you, consult your dealer about the problem.
2. If you installed the drive yourself, did you carefully follow all the instructions in Chapter 5 of this manual? Review the instructions and check all the cable connections to make sure you have installed it correctly.
3. Did you run the SETUP program to define the correct type of diskette drive as part of the computer's configuration? Did you set the FDD option in SETUP to **Enabled?** (See Chapter 2 of the *Setup Guide* for instructions.)

4. If you are still having trouble with the drive, run the Floppy disk system diagnostic tests, described in Appendix B. If the diagnostics program indicates an error, consult your Epson dealer.
5. If the diskette drive is making loud or unusual noises, contact your Epson dealer.

Hard Disk Problems

If you are having a problem with a hard disk, it could be the result of improper installation, incomplete disk preparation, or corrupted data. The suggestions in this section are divided into three categories:

- Installing the drive
- Preparing the drive for use
- Accessing data on the drive.

Consult the section that seems most likely to cover the problem you are having. For example, if you have been able to use data on your disk in the past but suddenly cannot, see “Accessing Data on the Drive.”

Caution

If your disk has data on it, be very careful before you perform any procedure that may erase data (such as formatting the disk). Always be sure to back up your data before reformatting or repartitioning the disk drive. Consult your dealer if you have any questions.

Installing the Drive

If you are having problems with a newly-installed drive, check the following:

1. If your dealer installed the drive, consult that person about the problem.
2. If you installed the hard disk in your computer yourself, did you carefully follow all the instructions in Chapter 5 of this manual? Review the instructions and check all the cable connections to make sure you have installed it correctly. Also check the jumper settings on your drive to make sure they are set correctly.
3. If you installed a hard disk drive and connected it to the hard disk drive connector on the main system board, did you run SETUP to update the computer's configuration information? Check to make sure you chose the correct drive type, and that the FDD option **is set to Enabled**. See Chapter 2 of the *Setup Guide* for instructions.
4. If you installed a non-Epson hard disk drive, was it physically formatted by the manufacturer? A blank, new hard disk must be formatted (or *initialized*) before you can partition it and install an operating system on it. This type of format is usually done by the manufacturer; if yours was not, you must do it yourself. If the drive came with its own format utility, use that program; if not, follow the instructions in Appendix B under "Hard Disk Format."

Note that this physical type of format is different from the software-based type of formatting commands (such as the MS-DOS SELECT or FORMAT commands). See "Preparing the Drive," below, for more information.

5. If you installed a hard disk drive with its controller on an option card, did you disable the built-in hard disk drive controller and select the correct drive type through SETUP? See Chapter 2 of the *Setup Guide* for instructions.

Preparing the Drive

Before you can store data on a new hard disk (which has already been physically formatted), you must do the following to prepare it for use:

1. Run the SETUP program to define your hard disk as part of the computer's configuration. (See Chapter 2 of the **Setup Guide** for instructions.)
2. Partition and format the drive for the operating system you are using. If you are using MS-DOS, instructions for performing these procedures and installing the operating system are provided in your MS-DOS manuals. If you are using another operating system, follow the instructions that came with it.

If you do not prepare the drive correctly, you will not be able to store data on the disk. For example, if you have partitioned the drive and formatted it for MS-DOS (or for another operating system) but you do not copy the operating system to the drive, you will not be able to load the operating system from the hard disk **when** you turn on the computer.

If you are sure the hard disk has been installed properly and you have prepared it for use as described above but you cannot access the drive, review the instructions in your operating system manuals. Make sure you performed **each** step in the installation process correctly for your configuration.

If you cannot identify the problem, **consult** your dealer.

Accessing Data on the Drive

If you have been using your hard disk drive successfully for some time and notice a reduction in performance, the data on the disk may have become fragmented. You may want to back up all your data and then use a disk compaction utility to reorganize the files on your disk. Contact your dealer for information.

If you still have trouble with your hard disk, you can back up your data and physically reformat the disk. Then you'll need to reinstall the operating system and copy your files back onto the disk. See "Hard Disk Format" in Appendix B and your operating system manuals for instructions.

If you cannot access data on your hard disk or you are receiving read/write errors, the disk may have a physical problem. Contact your dealer.

Software Problems

If you are having trouble with an application program, try the following solutions:

1. If the application program does not start, check that you are following the correct procedure for starting the program, and that it is installed correctly. If you have a hard disk and the program is stored in a directory on that drive, make sure you are logged onto or specifying the correct directory. If you don't have a hard disk, make sure you have inserted the correct diskette in drive A.

2. Your computer can run at either fast speed (33 MHz) or slow speed (11 MHz). While almost all programs work properly at the faster speed, some must run at the slower speed. Check your software manual to see if this is the case, and change the CPU operating speed if necessary. See “Changing the Processor Speed” in Chapter 2 for instructions and for information on accommodating copy-protected programs.
3. If you have entered an MS-DOS command that you want to stop, there are special key combinations you can type to tell MS-DOS to stop what it is doing. These methods may also work in your application programs:
 - ❑ Hold down **Ctrl** and press [c]
 - ❑ Hold down **Ctrl** and press **Break**.
4. An application program can occasionally lock the computer, making it unresponsive to the keyboard. If your computer does not respond when you type on the keyboard, you can reset it. Follow the instructions in Chapter 1.
5. If resetting the computer does not help, turn off your system, wait five seconds, and then turn it back on. Then you can restart your application program.

If none of these solutions solve your software problem, contact the software manufacturer for technical support.

Printer Problems

Below are some general steps to follow if you are having difficulty with your printer. If the problem persists and you need more detailed information, check your printer manual.

1. If your printer does not work at all, check that the printer has power and is properly connected to the computer. (Also, make sure your printer has paper in it.) See Chapter 1 of the *Setup Guide* for instructions or see your printer manual.
2. Check the printer manual for the printer's correct DIP switch or control panel settings. These settings help a printer communicate properly with the computer.
3. If you are using more than one parallel port or more than one serial port, the computer must know which port is primary and which is secondary. See Chapter 2 of the *Setup Guide* for instructions on how to define the parallel and serial ports using the SETUP program.
4. If your printer is properly set up but is still not functioning, test it from the MS-DOS level. When the screen displays the MS-DOS command prompt (such as `C>` or `A>`), hold down **Shift** and press **Print Screen**. This should print the contents of the screen on your printer.

If it does not, you may need to change the internal setting of the computer's parallel port for a parallel printer (or serial port for a serial printer). To do this, use the MS-DOS MODE or SETMODE command. See your printer manual and the MS-DOS manuals for more details.

5. Many application programs (such as word processors) must be set up properly before they can use a printer. Check your program manual to see what customizing may be required.

6. If you are using an application program that requires a printer driver, make sure the driver is installed properly. See your application program manual for instructions. Also see your printer manual for additional instructions on using your printer with application programs.
7. Try running the Printer adapter diagnostics test if you have a parallel printer, or the Communication adapter test if you have a serial printer. Appendix B describes these tests. If the test indicates an error, contact your printer dealer.

Option Card Problems

If you install an option card and it is not functioning properly, check the following:

1. Is the option card installed correctly? The most common problem with option cards is a loose connection. Make sure the card is well seated in its slot. Check the installation procedure described in Chapter 4 and also see the instructions that come with the card.
2. Did you set the necessary DIP switches or jumpers on the option card? See the card's manual for instructions.
3. Did you set the necessary jumpers on the main system board? See Chapter 4 for more information.
4. Did you run the SETUP program to update your configuration after installing the card? See Chapter 2 of the *Setup Guide*.
5. If you used the option card to add an external device to your computer, did you use the proper cable to connect the device to the cards connector on the back panel?

6. If you installed a high-resolution graphics adapter card, did you connect it to the alternate VGA interface with the feature cable? See Chapter 4.
7. Did you perform the correct setup procedures for the software you are using with the option card? If necessary, see your software manual for instructions.

Mouse Problems

If you have trouble with your mouse, check the following:

1. Make sure that your mouse is securely connected to its port on the back of the computer. Also, make sure you have connected it to the correct port. See Chapter 1 of the *Setup Guide* for more information.
2. If the mouse is connected properly, make sure that jumper J2 on your computer's main system board is set correctly for your mouse. See Chapter 4 for more information.
3. Did you install the mouse driver correctly? See your software manual and the documentation that came with your mouse for instructions.
4. If you're still having trouble, check the documentation that came with your mouse for any troubleshooting information, or contact your dealer.

Memory Module Problems

If you added extra memory to your system by installing SIMMs and that memory is not operating properly, check the following:

1. If the memory count displayed by the power-on diagnostics program is incorrect, you or your dealer may not have installed the SIMMs correctly. The SIMMs may be installed in the wrong sockets, they may be the wrong type, or they may not be inserted all the way into their sockets.

If your dealer installed SIMMs for you, contact your dealer; do not attempt to correct the problem yourself. If you installed them, see “Adding Memory Modules” in Chapter 4 and make sure you followed all the instructions.

2. Be sure to run the SETUP program after you install or remove memory modules to automatically update your memory configuration. See Chapter 2 of the *Setup Guide* for instructions.
3. If you are still having trouble with your SIMMs, write down any error messages and contact your dealer.

Battery Problems

The battery in your computer is a 3.6 volt, lithium battery. It should last from three to five years before you need to replace it. When the battery’s life is exhausted, you may see one of the following error messages:

```
CMOS battery state low  
CMOS system options not set
```

Purchase a new battery pack and follow the instructions in Chapter 4 to install it or have your dealer to install it for you.

Math Coprocessor Problems

If your math coprocessor does not seem to be operating properly, check the following:

1. Run the SETUP program and check to make sure that the math coprocessor **is listed as Installed** on the SETUP display. If **it is Listed as Not installed, you or your** dealer may have installed the coprocessor incorrectly. See Chapter 2 of the Setup *Guide* and Chapter 4 of this manual for more information.

Caution

If you need to remove the math coprocessor, contact your dealer for information about a special extraction tool; do not attempt to remove it without this tool.

2. If your math coprocessor is listed **as Installed in** the SETUP program but still does not seem to be working, check the manual that came with it for troubleshooting information and for any diagnostic procedures you can perform.

Glossary

Address

A number or name that identifies the location where information is stored in a computer's memory.

Analog monitor

A monitor that generates, responds to, or acts upon analog data. Analog data is transmitted by varying the voltage levels in a continuous current.

Application program

A software program designed to perform a specific task, such as a word processing or spreadsheet program.

ASCII

American Standard Code for Information Interchange. A standardized coding system for representing characters, such as numbers, letters, and graphic symbols. An ASCII character occupies one byte of storage. Many different computers, printers, and programs can use files transmitted in ASCII code.

Asynchronous

A method of data transmission in which one machine sends data one character at a time to another machine at irregular intervals that do not need to be synchronized to a timing device.

AUTOEXEC. BAT file

The batch file that is executed automatically when you load MS-DOS. See also *Batch file*.

Automatic speed

The feature that enables the computer to switch automatically from fast speed (33 MHz) to slow speed (11 MHz) when accessing a diskette drive.

Backup

An extra copy of a program, data file, or disk, that is created in the event your working copy is damaged or lost.

Base memory

The memory in the computer below 1MB that is available to MS-DOS and application programs usually 640KB. Also called conventional memory or main memory.

Batch file

A type of file that lets you execute a series of MS-DOS commands by typing one command. Batch files are text files with the filename extension .BAT. When you type the filename, MS-DOS executes all the commands in that file sequentially.

BIOS

Basic Input/Output System. Routines in ROM (Read Only Memory) that handle basic input/output functions of the operating system and the video controller.

Bit

A binary digit (0 or 1). The smallest unit of computer storage. The value of a bit represents the presence (1) or absence (0) of an electric charge.

Boot

To load the operating system into the computer's memory.

Byte

A sequence or group of eight bits that represents one character.

CGA

Color Graphics Adapter. A type of display adapter card that can generate up to 25 lines of text with 80 characters on each line, monochrome graphics at 640 x 200 resolution, or four-color graphics at 320 x 200 resolution.

Character

Anything that can be printed in a single space on the page or the screen; includes numbers, letters, punctuation marks, and graphic symbols.

CMOS

Complementary Metal-Oxide Semiconductor. A type of low-power silicon chip.

Code

A system of symbols for representing data or instructions. Also any software program or part of a program.

Command

An instruction you enter (usually on a keyboard) to direct your computer to perform a specific function.

Command prompt

The symbol or message that tells you MS-DOS is loaded and ready to receive instructions. The default command prompt displays the current drive and directory. If you are logged onto drive C, the command prompt may look like this: **c :>**.

Configuration

The particular setup of a group of components. A typical system configuration consists of a computer with one diskette drive and one hard disk drive connected to a monitor and a printer.

Control code

A command (generated when you hold down **Ctrl** and press another key on the keyboard) that instructs the computer to perform a specific function.

Coprocessor

See Microprocessor.

Copy-protected program

A type of program that cannot be copied. Some copy-protected programs require you to leave the program diskette in the drive while you are using it. Some also require the computer to be running at low speed (11 MHz) instead of high speed (33 MHz). *See also Automatic speed.*

CPU

Central Processing Unit. The primary unit of the computer that interprets instructions, performs the tasks you indicate, keeps track of stored data, and controls all input and output operations.

Cursor

The highlighted marker that shows your position on the screen.

Cylinders

The vertical alignment of tracks in a hard disk that can be lined up under one read/write head. The number of tracks on a disk is equal to the number of cylinders times the number of heads.

Data

Information such as text or graphics stored or processed by a computer.

Data diskette

A formatted diskette on which you store data files (as opposed to program files).

Default

Any value or setting that takes effect when the computer is turned on or reset. A default value stays in effect unless you override it temporarily by changing a setting or you reset the default value itself.

Device

A piece of equipment that is part of a computer system and performs a specific task, such as a disk drive, a monitor, or a printer.

Device driver

A file containing instructions that allow your computer to recognize and control a device.

Diagnostics

The tests and procedures the computer performs to check its internal circuitry and set up its configuration.

DIP switch

Dual Inline Package switch. A small switch on a computer, option card, or printer that controls a particular function.

Directory

A list of files stored in a particular area on a disk; part of a structure for organizing files into groups. A directory listing shows the name, location, and size of the files in the directory. A directory can contain both files and subdirectories.

Disk

The collective term for diskettes and hard disks.

Disk drive

The physical device that allows the computer to read from and write to a disk. A diskette drive has a disk slot into which you insert a diskette. A hard disk is sealed inside a protective unit.

Diskette

A flat piece of flexible plastic coated with magnetic material used to store data permanently.

Display adapter card

A circuit board that can be installed in one of the computer's option slots to provide the monitor interface. A display adapter card controls the way the monitor displays text and graphics. (In the Equity 386/33 PLUS, a VGA display adapter is built into the system board.) Also known as *Video card*.

DOS

Disk Operating System. A commonly used operating system that controls the computer's input and output functions. See *also Operating system*.

Double-density

A type of diskette format that allows you to store twice as much data as the standard-density format. A 5¼-inch double-density diskette can store 360KB of data. A **3½-inch** double-density diskette can store 720KB of data.

Drive designator

The letter name of a disk drive, followed by a colon-for example, C:.

EGA

Enhanced Graphics Adapter. A type of display adapter card that allows you to display high-resolution graphics on a compatible monitor. It can display up to 43 lines of text with 80 characters on each line, or it can display monochrome or N-color graphics at resolutions up to 640 x 350.

Expanded memory

Memory that specially written MS-DOS application programs can use with an Expanded Memory Specification (EMS) device driver such as EMM386.

Extended Memory

Memory above 1MB that is accessed by the protected mode of the 80386 microprocessor and is available to some application programs and operating systems.

Extension

A suffix of up to three characters which you can add to a filename to better identify it.

File

A group of related pieces of information called records, or entries, stored together on a disk. Text files consist of words and sentences. Program files consist of codes and are used by computers to interpret and carry out instructions.

Filename

A name up to eight characters long that MS-DOS uses to identify a file.

Fixed disk

See Hard disk.

Format

To prepare a new disk (or an old one you want to reuse) so that it can store information. Formatting divides a disk into tracks and sectors and creates addressable locations on it.

Graphics

Lines, angles, curves, and other nonalphanumeric data.

Hard disk

The enclosed unit used to store large amounts of data. Unlike a diskette, it is fixed in place. It can process data more rapidly and store many more files than a diskette. Also *called fixed disk*.

Hardware

Any physical component of a computer system, such as a monitor, printer, keyboard, or CPU.

Hexadecimal

A numbering system with a base of 16, frequently used by programmers. Any decimal number between 0 and 255 can be expressed by a two-digit hexadecimal number.

High-density

A type of format that allows you to store more data than on single- or double-density diskettes. A 5¼-inch high-density diskette can store 1.2MB of data. A **3½-inch** high-density diskette can store 1.44MB of data.

Input/output (I/O) port

See Port.

Inter/ace

A physical or software connection used to transmit data between equipment or programs.

Jumper

A small device that connects two pins on an option card, a disk drive, or the main system board to activate a particular function.

Key disk

A diskette containing a copy-protected program that must remain in the diskette drive while you are using the program.

Kilobyte (KB)

A unit used to measure storage space in a computer's memory or on a disk. One kilobyte equals 1024 bytes.

LIM 4.0 EMS

Version 4.0 of the Lotus/Intel/Microsoft Expanded Memory Specification—a protocol that allows certain application programs to use memory that MS-DOS cannot use.

Main system board

The board built into your computer containing the circuitry the computer requires to operate.

Math coprocessor

An optional device that enables the computer to process certain mathematical calculations faster.

MCGA

Monochrome/Color Graphics Adapter. A type of display adapter that runs either a monochrome or color graphics monitor.

MDA

Monochrome Display Adapter. A type of display adapter that displays text in only one color, such as green or amber.

Megabyte (MB)

A unit used to measure storage space in a computer's memory or on a disk. One megabyte equals 1024KB.

Megahertz (MHz)

A unit used to measure oscillation frequency (of a computer's internal timing clock). A megahertz is one million cycles per second. The Equity 386/33 PLUS operates at 33 MHz or simulates 11 MHz.

Memory

The area where your computer stores data. Memory contents are stored permanently (in ROM) or temporarily (in RAM).

Memory module

A small circuit board that contains memory chips. You can add 4MB memory modules to the main system board inside the computer to expand the computer's memory. A memory module is commonly called a SIMM (single inline memory module).

Memory on card

The additional memory on an option card installed in the computer.

MGA

Multi-mode Graphics Adapter. A type of display adapter card that can display monochrome text and color graphics on the screen.

Microprocessor

A small version of a CPU contained on one semiconductor chip.

Modem

A device that allows a computer to transmit signals over telephone lines so it can send and receive data. Modem stands for Modulator/DEModulator.

Monitor

The piece of hardware that contains the screen and displays information.

Monochrome monitor

A monitor that displays in only one color, such as green or amber, as opposed to a color monitor which can display in several colors.

Mouse

A hand-held pointing device with one or more buttons. When you slide the mouse over a flat surface in a certain direction, the cursor moves in the same direction on the screen.

MS-DOS

Microsoft Disk Operating System. The operating system most commonly used with your computer. See also *Operating system*.

Multifrequency monitor

A monitor that accepts input at different frequencies and can display a variety of resolutions.

Numeric keypad

The number and cursor control keys grouped to the right of the keyboard.

Operating speed

The speed at which the central processing unit can execute commands. The Equity 386/33 PLUS can run at 33 MHz or simulated 11 MHz.

Operating system

A collection of programs (such as MS-DOS, OS/2, or UNIX) that manages a computer's operations. The operating system determines how programs run on the computer and supervises all input and output.

Option card

A circuit board you install inside the computer to provide additional capabilities, such as a modem.

OS/2

Operating System/2. The enhanced operating system by Microsoft that provides dual mode processing and multitasking capabilities. See also *Operating system*.

Parallel

The type of interface that transmits all the bits in a byte of data simultaneously over separate lines. See also *Interface* and *Serial*.

Parameter

A qualifier added to a command that tells MS-DOS what particular conditions to look for and specifies information such as what data to process and where to locate or store a file.

Parity

A method used to verify the accuracy of data transmissions by adding a bit that makes the total of the byte odd for odd parity or even for even parity.

Partition

(1) The area defined on a hard disk for use by an operating system; (2) to divide a hard disk into separate sections or logical drives. You can define a primary partition and one or more extended partitions on a hard disk.

Password

The sequence of characters (up to seven) you type after you turn on the computer in order to access and use your system.

Pathname

The directory name(s) you specify to locate a file. For example, the pathname for the file SALES, stored in the subdirectory BUSINESS, is \BUSINESS\SALES.

Peripheral device

An external device (such as a printer or a modem) connected to a computer that depends on the computer for its operation.

Port

A physical input/output socket on a computer to which you can connect a peripheral device.

Power-on diagnostics

Tests that the computer runs to check its internal circuitry and configuration each time you turn it on.

Processor speed

See Operating speed.

Program

A file that contains coded instructions and tells a computer what to do and how to do it.

Prompt

A message the screen displays to request information or tell you what action you need to perform next. See also *Command prompt*.

RAM

Random Access Memory. The portion of the computer's memory used to run programs and store data while you work. All data stored in RAM is erased when you turn off or reset the computer; so you must store any data you want to keep on disk.

Read

To copy data from one area to another. For example, when you open a text file stored on disk, the computer reads the data from the disk and displays it on the screen.

Read/write head

The physical device inside a disk drive that reads data from and records data on the magnetic surface of a disk.

Real-time clock

A battery-powered clock inside the computer that keeps track of the time and date, even when the computer is turned off.

Reset

To reload a computer's operating system. Resetting erases all information in RAM.

RGB

Red Green Blue. A type of color monitor.

ROM

Read Only Memory. A portion of memory that can only be read and cannot be used for temporary storage. ROM retains its contents even when you turn off the power.

Root directory

The top directory in MS-DOS, designated by a \ (backslash). All other directories are subdirectories of the root directory.

RS-232C

A widely used, standard type of serial interface. You can connect an RS-232C device to the computer's built-in port.

Sector

A contiguous section of a disk track that provides an address at which the computer can access data.

Self test

The initial diagnostics procedures a system performs to check its hardware.

Serial

The type of interface that transmits data one bit at a time. See also *Interface* and *Parallel*.

Shadow RAM

The feature provided by the Equity 386/33 PLUS that enables the computer to copy the system ROM BIOS and video ROM into the RAM area of memory to speed up processing.

SIMM

See Memory *module*.

Software

The programs that enable your computer to perform the tasks and functions you indicate.

Subdirectory

A directory or group of files that branches down from another subdirectory or from the root directory.

Switch

An option added to an MS-DOS command that modifies the way the command works. Switches are usually preceded by a / (forward slash). See also *Parameter*.

System diagnostics

A series of checks you can perform on the computer to make sure the hardware is functioning correctly.

System diskette

A diskette that contains the operating system.

Tape drive

The physical device that allows you to insert large-capacity magnetic tape cartridges for compact data storage and backup.

Tracks

Addressable, concentric circles on a disk, resembling the grooves on a record, which help to divide the disk into separate accessible areas.

UNIX

An operating system that supports multitasking and is suited to multi-user environments. UNIX is compatible with a range of computers, from personal computers to mainframes. See also *Operating system*.

VGA

Video Graphics Array. A type of high-resolution display adapter. The VGA adapter built into the system board of your computer supports 16-color graphics at resolutions up to 1024 x 768 and 256-color graphics at resolutions up to 640 x 480 on a compatible VGA monitor.

Video card

A display adapter card that can be installed in one of the computer's option slots to provide a monitor interface. Your computer comes with a built-in VGA adapter, so you do not need to install a video card if you are going to use this interface.

Write

To store data on a disk.

Write-protect

To protect the data on a diskette from being changed by placing a write-protect tab over the notch on a 5¼-inch diskette or by setting the write-protect switch on a 3½-inch diskette. When a diskette is write-protected, you cannot erase, change, or record over its contents.

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